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Correspondence, views and opinions on all topics within the province of this journal are cordially invited from any part of the world. We will thank readers to forward to us—**promptly** as they occur—**Items of News,** or information relating to any application of electricity, also marked copies of their local papers containing anything likely to interest electricians. Anonymous communications cannot be noticed, nor can rejected manuscript be returned, unless accompanied by the necessary postage when received.

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REMOVAL NOTICE.

THE ELECTRICAL WORLD has outgrown its present quarters, and the necessity for more room compels it to move. Its new home will be in the stately fire-proof structure recently completed on the corner of Park Row, Beekman and Nassau streets, just across the City Hall Park from the office it has so long occupied on Murray street. The Potter Building is probably the handsomest office building on this continent, and there is no finer business location in New York, especially for a newspaper. THE ELECTRICAL WORLD has the entire Park Row and Beekman corner of the building, on the seventh floor, being room s 168 to 177 inclusive, and there is no pleasanter, lighter or more cheerful suite of offices in the building. We expect to be at least partially settled in our new quarters by July 1. We shall be pleased to have our friends visit us at their convenience after that, and take a look through the new rooms, and also a view of the lower part of the city, Brooklyn and Jersey City from our windows. The building has eleven floors, but four elevators are constantly running, and the upper floors are preferable to any below the seventh on account of the excellent light and ventilation and the splendid view.

When THE ELECTRICAL WORLD moved into the Murray street building, it occupied one room on the third floor. Subsequently it substituted for that a large room on the first floor. Then another room was added; after a while two more were taken, and later on it had nine different rooms, including several on the top floor, used principally as store rooms. That the present move is in the same direction as the former ones will be readily understood when we mention that the rent of the new offices is just three and a half times what we have been paying for the nine rooms in the Murray street building.

Our post-office box number remains the same as before, 3332. Letters by mail go to the post-office box, whether they have the office address on them or not. Of course our cable address, "Electrical, New York," also remains the same. Our telephone number will still be "586 Murray." Matters for the Editorial Department are to be sent as before, to the "Editor of THE ELECTRICAL WORLD, New York." Business communications should be addressed W. J. JOHNSTON, Publisher,
Potter Building, New York.

OUR Western correspondent gives in this issue an interesting account of the meeting of Railway Telegraph Superintendents, which he went to St. Paul from Chicago to report. Last week, it will be remembered, he gave a sketch of the meeting in Chicago of the American Train Dispatchers' Association. Both societies are strong, prosperous, influential and useful.

WE would remind our readers that the meeting of the Executive Committee of the National Electric Light Association next Tuesday, June 29th, at the Hotel Dam, this city, is that at which final preparations will be made for the Detroit gathering in August. It is therefore highly desirable that all who wish to communicate with the Secretary or the committee should do so at once.

THERE are more sputterings in the "Pan," and the public will be treated to further revelations of the kind recently made by a Congressional investigating committee. Rogers and his chums are out to such an extent that only $100,000 will repair Mr. Rogers' injuries and soothe his wounded feelings. Mr. Rogers is greatly mortified to have had his name associated with a Credit Mobilier scandal, and he proposes to take a substantial revenge.

ACCORDING to the latest news from Indianapolis, that city will soon again enjoy the use of the telephone. We agree with the Indianapolis *Journal* that the interference with the service by the State Legislature was due to nothing short of imbecility and "the indulgence of a stupid blind rage against a monopoly that the law did not reach." We hope that the new system of making each subscriber an agent will work satisfactorily, even though it be but a temporary measure.

AN index of the volume that ends with the present number will be found on pages 301 and 302. The mere enumeration of the hundreds of articles occupies, as will be seen, over four closely printed columns of small type, while no mention is made of the departments that fill three or four solid pages every week. The volume has contained also about 500 illustrations, many of which were choice wood engravings. It will be observed, too, that the reading matter has averaged nearly 12 pages each issue, or more, we believe, than that published by any other electrical journal either here or abroad.

HERE, in the more sedate East, we have grown so familiar with the electric light that a new installation does not elicit more than quiet congratulations and business-like calculations. But out at Laramie they take such events in a different way, and have just celebrated the starting of an Edison station there with fire-works, balloon ascent and band-playing. There is a winning heartiness about the Far West manner of expressing enthusiasm, and, after all, the introduction of the electric light—one of the greatest modern blessings—is something to be pleased over with more than usual complacency.

THE news comes from Canada that the proposed "deal" between the Canadian Pacific Railway and the Western Union Company, respecting a division of the telegraph business of the Dominion, has for the present fallen through. It is said that the Canadians are glad that the negotiations have ended in failure, but their joy may be premature, as the Pacific Railway still stands ready to make a bargain, and it is only natural that the Western Union Company should try to hold its own, and to keep the new lines out of territory it already occupies by lease, and also away from such cities as Buffalo, St. Paul and Detroit.

STATISTICS gathered in France show that up to May 1, 1886, there had been installed 1,044 electric lighting plants in that country. These comprise 5,880 arc lamps and 55,321 incandescent lamps. Workshops and factories stand at the head of the list of the arc lights, with 4,168. Then come stores and cafés, with 762, and theatres, with 324. But it is curious to note that the latter are closely followed by photo-engraving establishments, in which no fewer than 300 arc lamps are employed. On the other hand, it is equally strange to note that only 108 arc lamps and 140 incandescent lamps are employed in the lighting of public thoroughfares.

A FAIR idea of the extent to which electric motors of moderate size have already been introduced in France may be formed from the summary recently printed by the trustworthy *Bulletin International de l'Electricité*, of installations made up to April 1, 1886, by the Compagnie Electrique. This single company has effected 42 installations, using 190 Gramme machines with a total of 310 horse-power. Of these machines, 33 are employed for cranes and elevators, 40 in driving machinery and tools, 52 with ventilators, 11 in pumping, etc., and 54 for miscellaneous purposes. The return does not take note of small motors, but, as it stands, is sufficiently indicative of the rapidity with which power users are becoming familiarized with the electric motor.

WE publish to-day a letter in which the writer, thanking us for the unsolicited notice we have just given an invention of his, says: "I have learned to appreciate your journal by the fair, independent and public spirit you indicate through its pages." In illustrating and describing the invention referred to, our object, as usual, was to recognize the effort made in securing a highly desirable end, and to explain the manner of operation. Such work lies naturally and legitimately within our province, and is so often done that our readers have come to take it as a matter of course. Nevertheless, it is pleasant to find a prompt recognition of right endeavor. The ultimate source of strength of every journal lies in the feeling prevalent among those who read it that it is fair, independent and public-spirited.

THE ingenious method of vibrating the siphon of Sir William Thomson's cable recorder, which Mr. Charles Cuttriss has recently applied to the Mackay-Bennett cables, and which we describe in another column, marks a decided advance in this field. The one defect of the original Thomson recorder was the frequent failure of the ink and consequent delay, and many electricians have been working for years on the problem of doing away with the electrification of the ink and its accompanying evils. Mr. Cuttriss' invention, however, has solved the problem completely, and the new arrangement, which we have ourselves seen in regular operation, will, no doubt, find an extended application not only on the cable recorder, but in all delicate instruments, the records of which it is desired to make permanent. The present method of obtaining such indications by photography requires extreme care and entails serious expense, both of which drawbacks are obviated in the new arrangement. This ingenious invention and the further improvements in details upon the cable recorder, which are described on page 292, show that apparatus long in use and held to be very near perfection can in many cases be improved upon by attachments and devices which formerly were not admissible.

THE benefits to be derived from electrical treatment in many diseases, when such treatment has been left to the care of intelligent men who have made a study of the subject, often prompt people to try the same remedy without consulting a competent authority. Nothing can be more hazardous than this, and numerous cases could be cited in which treatment "at home" by electricity has resulted in permanent injury, usually in paralysis of the parts so treated. It was only recently that we heard of such a case from the lips of a physician who employs electricity largely in his practice, and another case has been reported from Portland, Oregon, to the effect that a quack, simulating the power of magnetic healing, wore shoes with metallic plates upon the soles. Thus, standing on other metallic plates connected to a battery which was concealed he was able by the current passing through his body to transmit it to his patients, or rather his victims, "by the laying on of hands." He claimed, of course, that the power of the battery was inherent in himself. The result of this continuous passage of current through the body has been to paralyze the quack, as might have been predicted. It may not be generally known that in the infancy of the medical application of electricity the current, even by reputable operators, was passed through their own bodies in order to give them an indication of its strength. The physician would hold one electrode, the patient the other, and the former, by stroking the part affected, with his hand, would transmit the current to the patient. The evil effects of this constant passage of current through the body soon became apparent, and the practice was abandoned. To-day the medical galvanometer supplies the physician with the means of indication, without which intelligent treatment is hardly possible.

REVIEWS OF NEW BOOKS.

ELECTRO-DEPOSITION. A Practical Treatise on the Electrolysis of Gold, Silver, Copper, Nickel, etc., with several chapters on Electro-Metallurgy. By Alexander Watt. New York, D. Van Nostrand. 1886. 568 pp. Price $5.

The small volume entitled "Electro-Metallurgy" by the same author has met with such success that Mr. Watt feels called upon to venture on the production of something more elaborate on the same subject. The new work is one which must be classed with the best on the subject, and it contains much new and valuable matter which is now put in book form for the first time.

Among the introductory chapters, that giving a historical review of electro-deposition is a most interesting and valuable addition.

The author treats very fully of the processes of depositing gold, silver, copper and nickel, entering into the minutest details, for which work his practical experience eminently fits him.

We are glad to note that the author has given considerable attention to the growing art of electro-metallurgy of lead, zinc, gold, etc., and particularly to that of copper. The book has been brought down to recent date, the Cowles process of fusion by electricity being described.

We can recommend this book as one of the best upon a subject which is occupying more and more attention in the industrial field.

TRAITÉ PRATIQUE D'ELECTRICITÉ INDUSTRIELLE. By E. Cadiat and L. Dubost. Beaudry & Cie. Second edition. Paris, 1886. 583 pp., 8vo. Price $4.

The success with which the authors have met in the first edition of their book has encouraged them to believe that an elaboration of the original plan will meet with further success. The book, as its title indicates, is a practical treatise on some of the principal departments of applied electricity. Without neglecting theory, the latter has only been introduced for the purpose of elucidating the laws underlying the practical application. This feature will no doubt make the book acceptable to a large class of readers unacquainted with electrical theories and their direct application. The volume is divided into various parts, and comprises the general principles of electricity and electrical measurement, electric generators, electric lighting, transmission of electrical energy, electro-deposition, electro-metallurgy and telephony.

The book is profusely illustrated by 222 engravings, and the treatment throughout is clear and eminently practical in its bearing.

The Great Illuminated Fountain on Staten Island.

One of the greatest attractions at the recent exhibitions in London has been the illuminated fountain designed by Sir Francis Bolton. It has already been illustrated in THE ELECTRICAL WORLD. In this the most beautiful spectacular effects were produced by means of the electric light, which was thrown into and upon the streams of water, and made to vary with all the colors of the rainbow.

Within a week a similar fountain will be put in operation on the grounds of the Staten Island Amusement Company, and the arrangements which have been made will, without doubt, place this one far ahead of the former in point of beauty and size.

The basin of the fountain is 120 feet square, and below its level in the centre there has been constructed an apartment 40 feet square, in which the apparatus for manipulating the jets and the lights has been placed. This apartment is entered by two tunnels, and is eight feet in height, so that it allows of ample opportunity for easy manipulation. The roof thus constitutes the bottom of the fountain, and through it 15 apertures have been made and glazed, each 24 inches in diameter. These are all covered with stout glass and made watertight. Below each is placed an arc lamp of 8,000 c. p. The light from each will be reflected directly upward into the stream of water, which is projected from nozzles placed exactly over the centre of the apertures. In this manner the light will, by internal reflection, be kept entirely within the stream of water, and as the jet breaks at the top most beautiful effects are obtained.

In front of each aperture is a shelf upon which horizontal screens of colored glass are placed, moving upon rollers, and all of which in the same line are connected together. In this way a single movement changes the color of a corresponding number of jets, so that a large number of combinations are possible with the fifteen lights.

All the jets are controlled by valves, and they can be varied *ad libitum* for different effects. Besides these powerful lamps below the fountain, a beam from a search light placed in an adjoining tower will be thrown upon the water. Moreover, thousands of Edison incandescent lamps, placed in artistic arrangement about the fountain, will add to the rare beauty of the scene.

With the water pressure available, viz., 75 pounds to the square inch, and a full supply from a ten-inch main, a height of probably 150 feet will be attained by the jets. Situated upon an elevation overlooking New York Bay, this beautiful piece of work cannot fail to attract visitors, especially as all will be permitted to inspect the full operations.

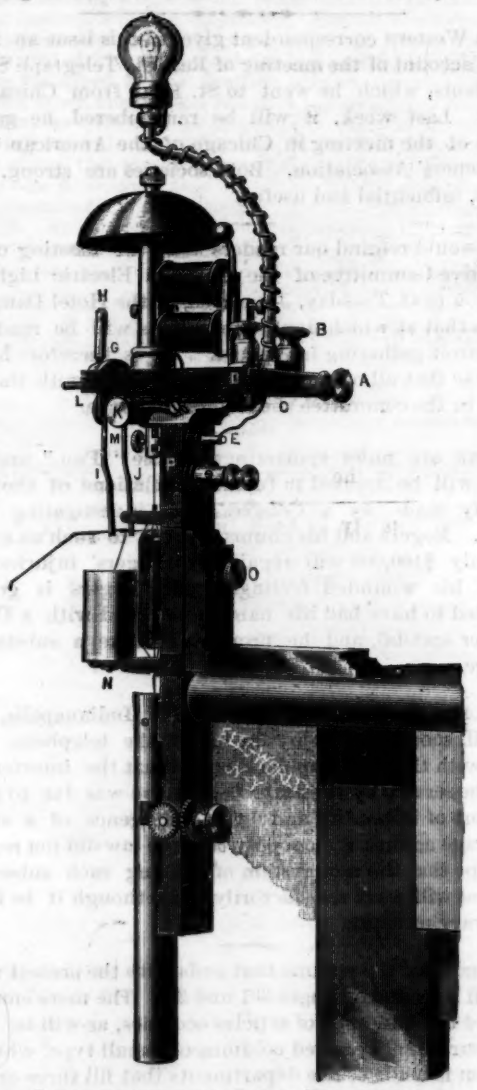
Some idea of the magnitude of the enterprise can be obtained from the statement that it will require 25 men to operate the fountain alone, and by way of comparison we may mention that while in this case fifteen arc lamps are employed under the fountain, in London the fountain has had only five.

The whole grounds and buildings are to be lighted by electricity, and in order to permit of games being played at night, the large base-ball field has been encircled by arc lamps at short intervals. The adjoining buildings and grand stand have about 500 incandescent lamps distributed among them so that there will certainly be no lack of light. The power installation consists of four Armington & Sims engines aggregating 250 h.-p. and seven dynamos, of which two are incandescent machines. The work has been carried on under the general supervision of the well-known lighting expert, Mr. L. Stieringer, and the incandescent and arc lights are respectively on the Edison and Brush systems, the installation of the arc lights being in the hands of Mr. William McGrath, of the Brush company in this city, and the incandescent wiring by Messrs. Noll Bros.

We may add that the power plant also furnishes current for 50 arc lamps which are situated five miles distant in Erastina, another pleasure resort shortly to be opened by the enterprising Mr. Erastus Wiman, the originator of the one above described.

Some Novel Improvements in Cable Recorders.

Ocean cable operators frequently have intervals of leisure in which the line is not in use, especially at night, and they naturally incline to take advantage of this by enjoying a rest, or some exercise, but always in the



IMPROVEMENTS IN CABLE RECORDERS.

vicinity of the instrument. As the record made by the recorder is effected without any audible sound, it becomes necessary, therefore, to devise some plan by which the operator's attention is drawn to the fact that a message is coming over the line. For that purpose call bells are sometimes interposed in the cable circuit, which are rung by the current calling the station, but this is only practicable on short cables. In order, however, to put the same arrangement of calling upon long cables, Mr. Wm. England, of Galveston, Tex., who is connected with the Mexican Telegraph Company's cable service, has devised an ingenious plan by which the bell is placed in local circuit, the circuit of which is closed by the movement of the siphon.

As will be seen in the accompanying illustration, the battery is connected to the two terminals *B* and *D;* one of these terminals *B* is connected to a screw *E*, which pierces the centre-piece *P*, and carries connection by a very fine wire to the piece of platinum, on which the glass siphon rests. The other pole is connected through the bell to the top of the forked platinum switch *G*, so that when the handle *H* of the switch is turned over, it brings the forks *I J* into position, and places them very close to the piece of platinum on which the siphon rests; therefore, with the least movement of the coil to either side, the platinum will touch both forks alternately, and thus the circuit is completed and the bell rings.

By means of the switch the forks can be adjusted to suit any position of the coil, and the arrangement is found in no way to lessen the free movement of the coil, first-class signals being obtained.

Mr. England has also added several improvements on the recorder, one of which consists in a new arrangement of a combined coil adjuster and coil suspender. In the old arrangement any alteration of the coil is effected by means of a top-suspending screw, which, when loosened to enable the coil to be adjusted, allowed the coil to drop more or less, and always required time to readjust it.

In the present arrangement, the outside top suspending and adjusting screw has been done away with. By a simple turn of either of the two screws *K L*, on the side and front respectively of the centrepiece, any adjustment can be instantly obtained, without altering or interfering with the suspension of the coil. As will be seen, the suspension thread is placed in a grip *M*, which is opened or closed by means of a screw, and the thread run through a small hole in one of the pieces forming the grip, and retained in position to suit any suspension by closing the grip. The end of the thread running through the hole can be left free and of just sufficient length to catch hold of in case it should be desired at any time to raise or lower the coil, or the end can be attached to a screw for the purpose.

In order to obviate the frequent filling of the ink well, Mr. England has made the latter adjustable so that it can be raised or lowered by the aid of the screw *O*. Thus, if the ink should run below the end of the siphon, the well can be raised, and this can be repeated until there is hardly any ink left. The well can be rapidly detached from the stand *N*, which slides in a slot. A cover cap, not shown in our engraving, completely covers the upper portion of the coil and its connections and protects them from rust, injury and dust. It can easily be removed, as no screws are employed in fastening.

As mentioned before, the cable operator frequently has periods of rest when his services are not required and the presence of light is undesirable. But means must be provided for rapid and convenient illumination when signals are received, and for this purpose an incandescent lamp, run from a battery, has been attached to the top of the recorder in the manner devised and shown. One pole of the battery is connected to the screw-plug *A*, which is attached behind the ebonite slab, and the other pole to the screw *B*. When light is desired, the screw-plug *A* is taken out and placed in the hole *C*, situated in the bottom of the support which holds the lamp. This support is one conductor, and the wire wound round it is the other.

The New Orleans Telephone Decision.

With regard to the recent decision at New Orleans in favor of Bell, a special dispatch from that city, of June 18, says: Judge Pardee has rendered a decision in the case of the American Bell Telephone Company against the National Improved Telephone Company, on the application of the Crescent City Telephone Company to be allowed to dissolve the injunction on bond. The decision is as follows: "As intimated on the hearing, the motion to bond the injunction pendente lite heretofore issued against the Crescent City Telephone Company must be denied. Considering, however, solely the matter of inconvenience to the public, we think that the said company should have a short delay—say, from sixty to ninety days—in which to wind up its business, and this we are disposed to grant, provided, however, that said company shall not make any new contracts, nor renew any old ones, and shall remove instruments as fast as contracts expire, and that their business shall be closed up in the time mentioned."

The Crescent City Company declare that they have not by any means abandoned the fight, and they will be heard from again before long with considerable emphasis.

"Rogers and We Are Out."

The Pan-Electric broils and troubles are not yet at an end. At Washington, on June 19th, Mr. Woodbery Wheeler, Counsellor in Chancery, filed with the clerk of the Equity Court a bill by J. Harris Rogers, against Attorney General A. H. Garland, Senator Isham G. Harris, Railroad Commissioner Joseph E. Johnston, Indian Commissioner J. D. C. Atkins and ex-Congressman Casey Young for dissolution of partnership and account, plaintiff claiming that he is entitled to damages for $100,000 and a decree for that amount by their failure to perform their contract. This is the celebrated Pan-Electric Company, which organized the Pan-Electric Telephone Company and Pan-Electric Telegraph Company, and has recently been the subject of investigation by a special committee of the House of Representatives.

Regarding the intention of the plaintiff, Mr. J. Harris Rogers said that three weeks ago he wrote to the defendants, Messrs. Garland, Harris, Young, Johnston and Atkins, that he intended to force a settlement of his just claim. In his letter to these gentlemen he said: "I do not intend to be left, as the inventor, to hold the 'bag' while you run off with the great bulk of the money—some $40,000 in cash and about $2,000,000 in good local stock—to shelter yourselves under the throne of the national administration." Receiving no answer, he has

brought suit. The complaint is very long. It begins by setting forth that on or about the 1st of January, 1883, complainant was the owner of a large number of inventions, which in their ultimate development would pertain to almost every branch of electrical science; and having spent nearly his whole life and large sums of money on the same, he was desirous not only to put some of them into practical operation on a large scale, but to develop them all. He goes on to relate that he originally took in with him several comparatively obscure but highly honorable citizens, to wit: Rev. John Rochford, O. S. D.; Gen. Marcus J. Wright, Christian G. Schneider, Major Richard C. Wintersmith and Gen. Basil Duke.

Complainant further says that such were the high values set upon his various inventions that the defendants subsequently estimated the same to be worth $5,000,000, and Senator Harris spurned the idea of accepting $5,000,000 for the telephone only when one Augustin suggested that said amount would be given for it by the American Bell Telephone Company. He relates that he could easily have formed a company covering any one of his inventions, but preferred a charter covering all.

"But complainant realizing the difficulty of securing such a charter as that required without associates more influential than those aforesaid, and realizing still more the difficulty of giving the stock to be issued and sold as stated a national reputation and of selling the same throughout the whole country without more illustrious names to promote it than those which had already been obtained, he tried to secure other additional associates, having such national reputation and who could influence some legislative body to grant the comprehensive charter with its valuable franchises and who could, by their illustrious names, guarantee sales of the stock where complainant and his first associates were unknown, and so carry on the contemplated enterprise."

Accordingly in February, 1883, he called on Atkins, Harris and Young, who agreed to join him.

"They made the condition that they should choose all their associates in the enterprise, to which complainant agreed, and promised to allot to them each $500,000 of the stock to be issued, on a basis of $5,000,000—*i. e.*, $3,000,000 for them all, including three other persons, whom they were to select—and who were to receive each $500,000 of the stock, which Harris said was too liberal in complainant, but that he believed there would be fortunes in the enterprise for 100 men, and therefore would accept the proposition made without complaint."

The outcome of the scheme is known to all the world.

The Quality of Iron in Field Magnets.

It is well known what an influence the quality of the iron in the field magnets has upon the ultimate output in a dynamo, and a case in point is mentioned by Mr. Gisbert Kapp, showing how impossible it is to foretell accurately the performance of a dynamo unless the quality of the iron be exactly the same in the manufactured machine as the sample submitted. In the case of two machines manufactured for him, there was a difference of electromotive force of twenty per cent. between the two, although the machines were of exactly the same dimensions and treated in the same manner. It was imagined that in the first machine the iron magnets had not been sufficiently annealed, in consequence of the shortness of time allowed for the work. A second pair of field magnets were ordered and an extra time allowed for work, the consequence being that twenty per cent. more electromotive force was obtained.

An Electric Wire Road.

A system of transporting freight and passengers is now being introduced by the Suspension Transportation Company, of 40 Water street, Boston, under various patents, covering the use of electricity, steam or other motive power for aërial transportation.

The general *modus operandi* of this company's system for an electric wire road is well illustrated in the engravings. Figs. 1 and 2. It is evident that such a system, while not interfering with the cultivation of the soil or with

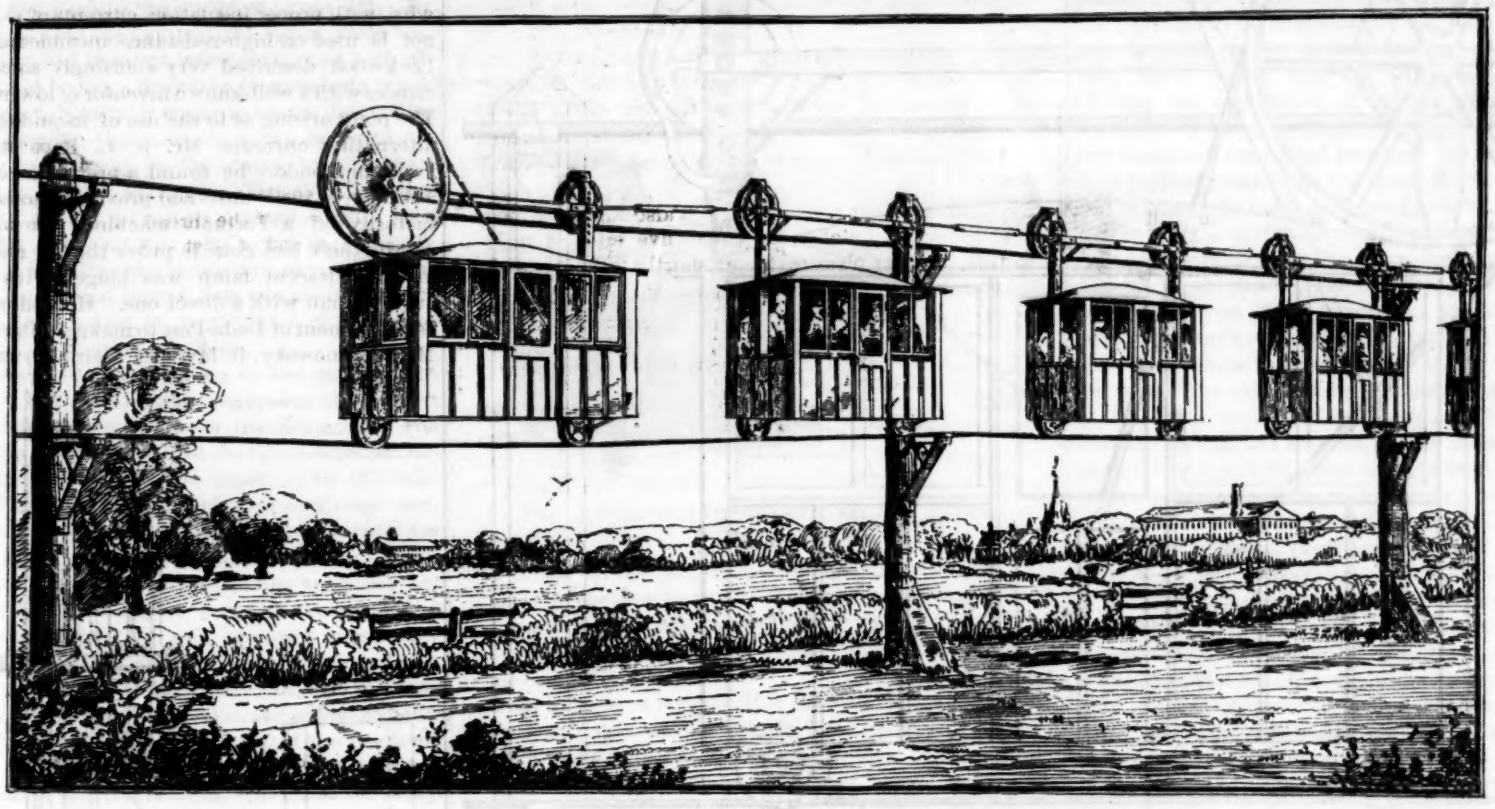


FIG. 1.—ELECTRIC WIRE ROAD FOR PASSENGERS.

pasturage, is free from danger to man and beast, and a mere right of way is sufficient without the cost of the fee. Again, it requires no cuttings or fillings, and is thus adapted to uneven, rocky, or uncleared land, and the turning of sharp curves presents no obstacles. In crossing streams no bridges need be used.

The opportunities for the application of this system are vast, and the variety of uses to which it can be put is very great both in cities and in the country.

An experimental line of this character, with a capacity for transporting several tons in weight upon the cables, is now in successful operation at the works of Mr. Leo Daft, and the details of the system will prove interesting.

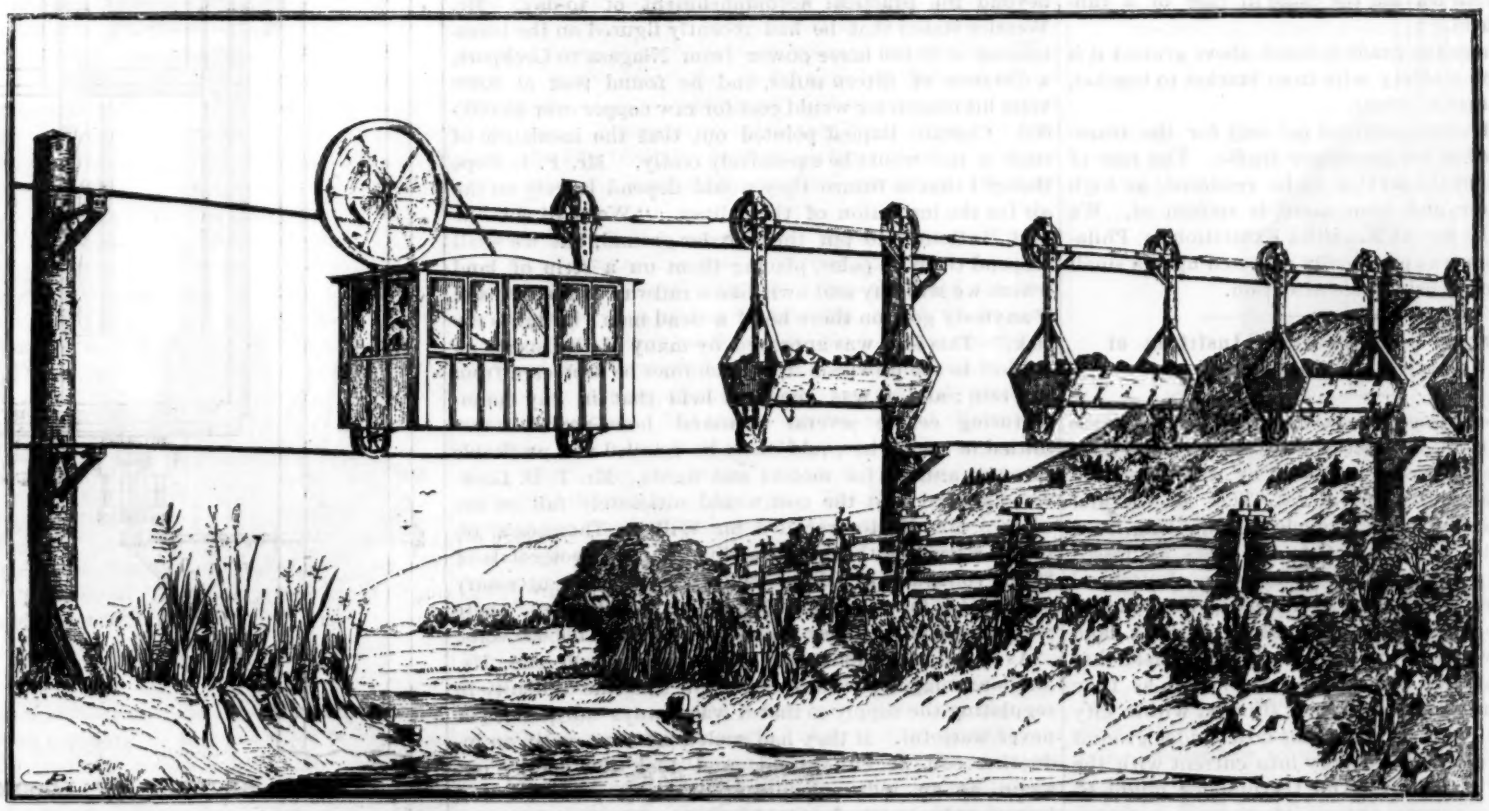
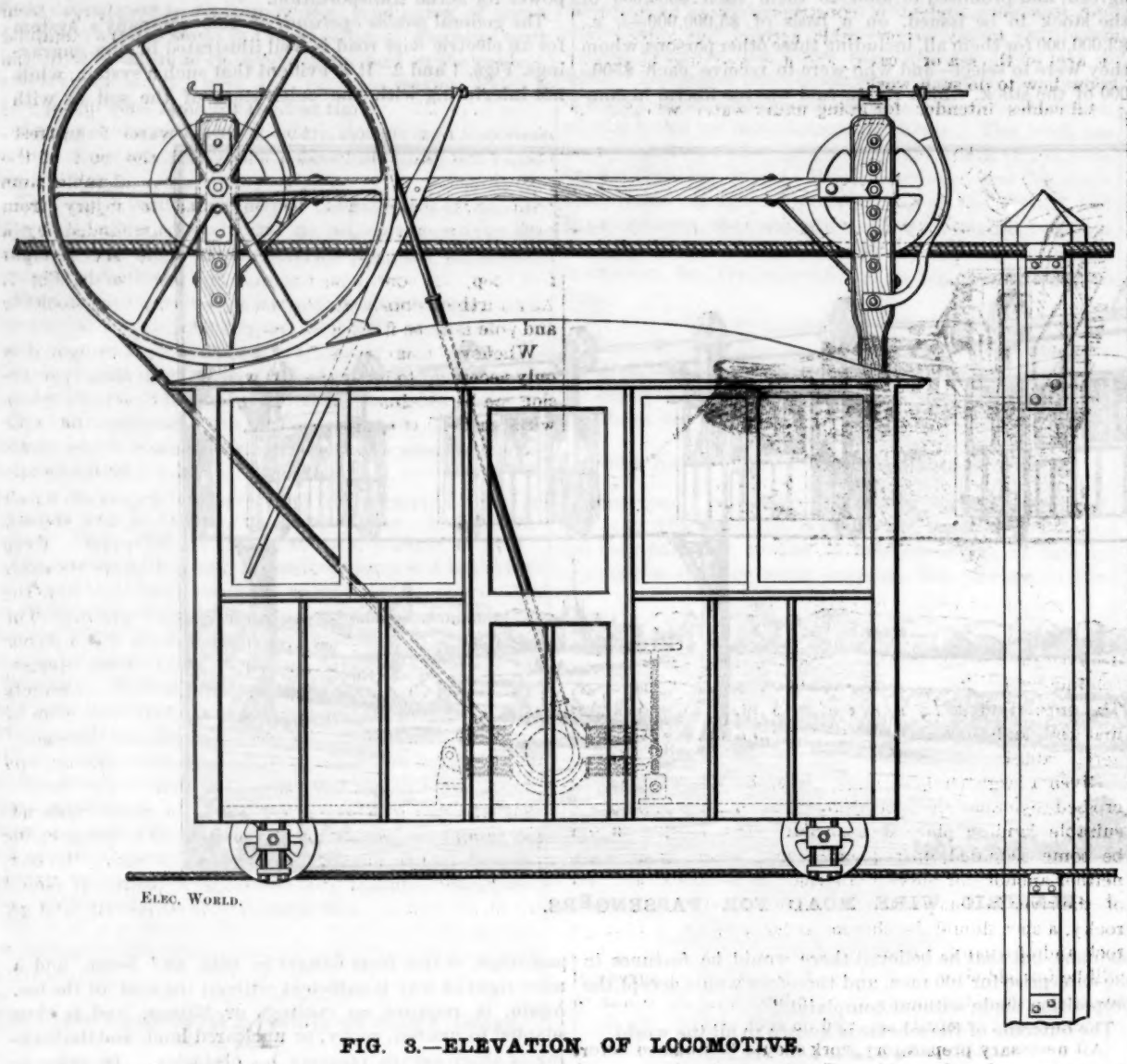


FIG. 2.—ELECTRIC WIRE ROAD FOR FREIGHT.

The posts that carry the cables are placed 30 feet apart, and the cables are supported upon wrought-iron brackets bolted to them. The cables rest upon rubber strips placed in clamps at the end of the braces. This is clearly shown in Figs. 3 and 4, which represent the locomotive in elevation and in section as it appears suspended between the cables. The latter are of steel, the upper being two inches in diameter and the lower one inch. These are placed in the same vertical plane and are 7 feet 6 inches apart. The current passes from the upper to the lower

cable, the motors being in parallel or multiple arc between them. The motor within the car is geared to a large wheel mounted upon the same shaft with the forward grooved traction wheel, and is pivoted on one end, so that all slack in the belt may be readily taken up. The braking will be accomplished by



ELEC. WORLD.

FIG. 3.—ELEVATION OF LOCOMOTIVE.

electrical means, but hand brakes are also provided as shown, which can be applied through the medium of the long lever entering the car, the other end of the lever being attached to the rod connecting the brake-shoes on the two wheels. Two safety catches are attached to each car and are placed alongside the upper wheels. They prevent the car from leaving the cable in case of a running off of the wheel.

In all places where the grade is much above ground it is proposed to stretch a safety wire from bracket to bracket, thus insuring against accident.

The system evidently is adapted not only for the transportation of goods but for passenger traffic. The rate of speed will depend on the service to be rendered; as high as 25 miles an hour, and even more, is spoken of. We may add that at the recent Novelties Exhibition in Philadelphia, this system was practically operated upon a small scale, and attracted considerable attention.

June Meeting of the American Institute of Electrical Engineers.

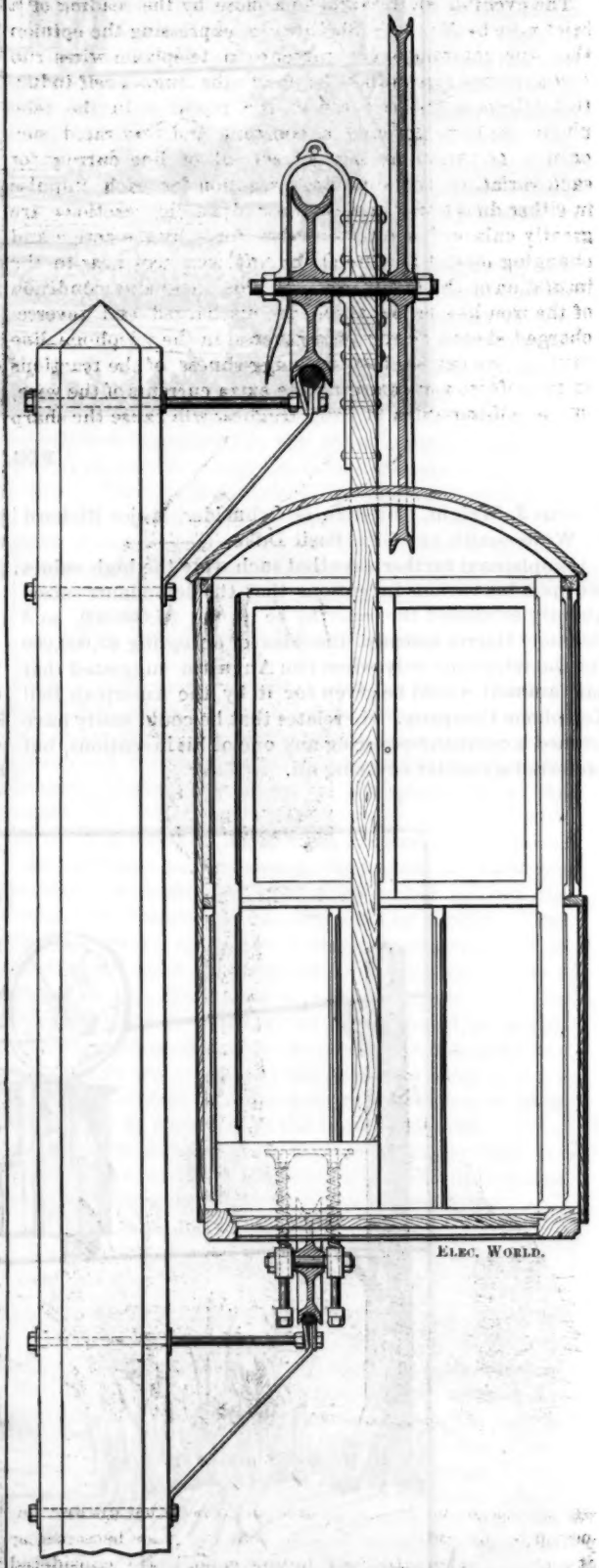
It has already been briefly mentioned that the American Institute of Electrical Engineers held a very successful meeting on the 8th inst., preceded by dinner, at the D'Orville restaurant, Broad street. The subject first brought up for discussion was incandescent lighting from central stations to which Dr. Otto A. Moses addressed himself in an able, extemporaneous advocacy of "central stations somewhere where fuel would be at its cheapest, labor very cheap, space costing next to nothing, and where supplies would be without fail." He held that central stations should always be extra-mural, as they were liable to many accidents when situated within city limits. He would even consume the coal under ground in the pit, there convert its energy into current with the roughest kind of dynamos—even thermopiles might be used—and store the current at the surface.

Ultimately, electricity would, he thought, be derived directly from fuel, but not until he was grayer. Meantime, with the aid of storage batteries and secondary generators, or induction "transformers," the system he favored could be carried out, so that currents of the highest potential could be sent over the trunk wires and then could be taken off at the safe electromotive force required by the consumer. His idea, summarized, was: "First, burn coal cheaply in the mines; drive large engines, these turning dynamos of exceedingly low potential; transform your currents at the surface. After they have been stored in the secondary batteries, you can couple up your secondary batteries to any potential you please. You can use your current as long as you please, and you keep it stored. That seems to be the method for the purpose of getting a source of electrical supply absolutely unlimited. When you get it here, you can redistribute and retransform it. You will get it as cheap as natural gas. You will get electricity by that means much cheaper than you do oil by bringing it through large pipes, or than coal by carrying it on railroad cars." In conclusion, Dr. Moses said he would not hesitate to use on his main lines a potential of 10,000 volts.

In the discussion that followed, objection was taken by some to the scheme that it was somewhat visionary, or beyond the practical accomplishment of to-day. Mr. Wetzler stated that he had recently figured on the transmission of 50,000 horse-power from Niagara to Lockport, a distance of fifteen miles, and he found that at 3,000 volts his conductor would cost for raw copper over $5,000,000. Captain Rapieff pointed out that the insulation of such a line would be excessively costly. Mr. F. L. Pope thought that in future they would depend largely on the air for the insulation of these lines. "We shall not," he said, "attempt to put them under ground, but we shall suspend them on poles, placing them on a strip of land which we will buy and own like a railway company; and if anybody goes on there he is a dead man; he takes the risk." This idea was approved by many of the speakers, subject to the provision that such lines be protected from the rain; and it was generally held that in any manufacturing centre several thousand horse-power transmitted in such wise could easily be retailed at a profitable rate per annum for motors and lights. Mr. T. D. Lockwood argued that the cost would ultimately fall on the users. Mr. Martin recalled Sir William Thomson's remarks regarding the practicability of using potentials of 80,000 volts, and Dr. Moses said that with the necessary precautions taken to guard Mr. Pope's "death lines," there was no reason why they should not go up to 100,000 volts.

As to the use of induction coils, one at each end, Mr. Mailloux suggested that there might be some difficulty in regulating the supply so that it was always adequate, yet never wasteful. If they had such a system, with an induction coil at either end, and took the energy out again as an induced current of lower potential and larger volume, they would meet with the difficulty that as the amount of energy consumed would depend upon the amount used at the second induction coil, there would be no means of regulating that energy so that it would be adequate. He could conceive of a time when there would be more energy called for than was obtainable from the circuit; and at another time the circuit would be wasting energy. He, therefore, thought that they must have not only the means of transforming the energy, but of storing it at the point where it was to be utilized.

At this point the discussion turned to the possibility of using low-resistance incandescent lamps, so as to meet the varying needs that have to be satisfied by the modern central station. Dr. Moses expressed an opinion against such lamps, primarily on the ground of the cost of conductors. But the main difficulty was the machinery about them: "The problem that every inventor ought to set before himself, and he should repeat it after every thought, is, can I simplify this thing? And when he gets it down to such a condition that it cannot be simplified any more, then the thing is perfect. You cannot have a simpler arrangement than a carbon loop; and when you have got that and a constant current, why must you interpolate machinery in it anywhere? Let the machinery do its own regulating, and the lamp its own." He saw no reason why, with proper insulation, currents of 5,000 volts should not be used on high-resistance incandescent lamps. Mr. Lockwood described very amusingly some of his experiences with a well-known inventor of low-resistance lamps. The point arising as to the use of incandescent lamps with alternating currents, Mr. F. L. Pope stated that when lately in London he found a pretty large installation of Whiteley's, the "universal provider," to be working satisfactorily off a Ferranti machine. He was told that the results there had gone to prove that in reality the life of an incandescent lamp was longer with an alternating current than with a direct one. He understood the Ganz establishment of Buda-Pest to make similar claims, through Mr. Zipernowsky, in favor of their alternating system.



ELEC. WORLD.

FIG. 4.—SECTION OF LOCOMOTIVE.

The next point raised was the blackening of the lamps and the causes of it. Taking up a remark of Dr. Moses that the rapid changing of polarity with alternating currents might produce a disintegrating effect, Mr. Mailloux said it would appear to him more rational, regarding the filament, as the Doctor had before suggested, as an electrolyte, to say that the deterioration of the incandescent lamp was due to a continuous current. In an electrolyte subject to decomposition, an alternating current does not have any effect, but with the continuous current there would be the same tendency to the migration of the ions, and might that not be nothing but a disintegration. Mr. Wetzler called attention to the new Siemens method of

using hydrogen in the bulb to prevent this traveling. Capt. Rapieff regarded the method with disapproval. He would prefer iodine. Mr. Mailloux inquired whether the form of the areal section had not a great deal to do with the illuminating power of the lamp, so that a filament having a circular area section would give more light than a flat one. He thought the Hughes experiments showed, for one thing, that a flat filament stamped out of a sheet of paper or fibre cannot be as efficient as a filament made circular out of thread or round fibre or any form like that, such as carbonized wire or the like. Mr. G. A. Hamilton instanced the Cruto lamp, but Capt. Rapieff held that it was not wise to use a tube as Cruto did. Mr. E. L. Pope thought that the commercial lamps made with cylindrical carbons had in many instances given a high efficiency. "It would be very desirable if somebody would take up that matter, because it seems to be an interesting one. It is also possible that the discharge between the terminals of the carbon may be facilitated by the sharp corners of the rectangular filament. We all know that static electricity discharges itself with great facility from a point or an edge, and that may play a part in the problem." Dr. Moses held that the light from the cylindrical carbon, such as carbonized thread, was less pleasing to the eye than that from a carbon of rectangular shape. This view was not shared by other speakers.

The evening was brought to a close by the reading of a brief note by Mr. S. F. Shelbourne, expressing the opinion that the retardation of currents in telephone wires run through iron pipes might be due to the Hughes self-induction effects in the soft iron of the pipes. "In the telephone, we have not only a constant and very rapid succession of variations, but a reversal of line current for each variation, and a dynamic reaction for each impulse in either direction. If now these dynamic reactions are greatly enlarged in electromotive force by the action and changing magnetic state of the soft iron very near to the insulation of the conductor, and this magnetic condition of the iron has to be taken on, discharged and reverse-charged at each change and reversal in the telephone line current, we can see how the sluggishness of the reactions in the soft iron in enlarging the extra currents of the wire, or the self-induction of Prof. Hughes, will cause the sharp

FIG. 2.—RIVER CABLE BOX.

variations in the telephone current to be filled up and impeded by the extra currents, so that the voice becomes, as it were, an attenuated and hollow echo." He considered the recent experiments of Prof. Hughes to show that there is inherent magnetism in iron, and he proposed the use in such pipes, for the future, of iron containing more of carbon and impurities of silicon, arsenic, phosphorus and other, it being rendered thus far less magnetic and susceptible.

The Farnsworth Suit is still before Judge Lawrence. Evidence now being taken deals chiefly with the early relationship between the American Rapid and the Bankers' & Merchants companies.

Another Bell Victory.—A dispatch from Parkersburg, W. Va., of June 22 says: In the United States Circuit Court, Judge Bond to day granted an injunction in favor of the American Bell Telephone Company, in the suit against the Long Telephone and Telegraph Company.

River Cabling.

BY D. B. MACQUARRIE.

It seldom falls to the lot of the average telegraph or telephone man to have anything to do with deep-ocean cables. This service is generally performed by a trained crew and a skillful corps of electricians. But any foreman or superintendent of construction may be called on at any time to lay a short cable across a navigable river, an arm of the sea or a canal, and it is well that he should know how to do such work.

All cables intended for going under water, whether for

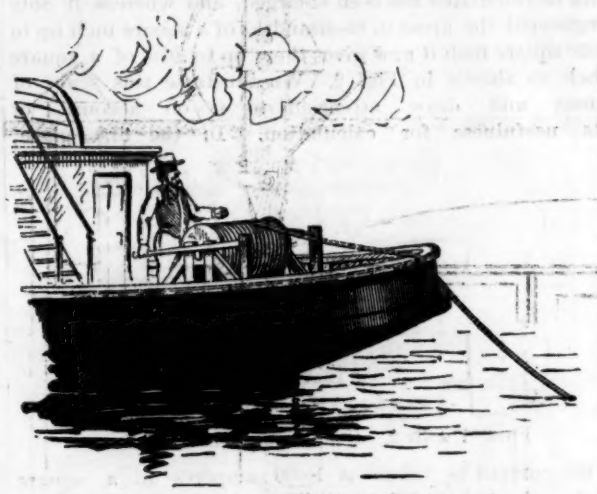


FIG. 1.—LAYING ORDINARY CABLE IN RIVER.

deep-ocean service or river-crossings, are armored. The conductors are few in number, seldom more than 8 or 10. The insulation is always greater in bulk, of a different material, and more carefully put on than that required for aerial cables.

Given a large navigable river like the Mississippi to be crossed by cable, the first thing to be done is to secure a suitable landing place at each side. The locality should be some secluded, unfrequented spot, where steamboats neither anchor nor make a landing. If the banks and bed of the river in that particular neighborhood are generally rocky, a spot should be chosen as far as possible clear of rock and of a sandy nature, so that the cable on being laid will be imbedded in the bottom of the river. A survey of the route should be made by sounding, and the banks be examined and carefully selected on each side.

All necessary preparatory work should be finished before beginning to lay the cable. The terminal poles on each side should be planted, and the cable boxes fastened to them. Each cable pole should have a groove cut out from the butt to the bottom of the cable box. This groove should be made in two parts—the deeper part for receiving the cable about an inch wide and an inch and a half deep, and the second part about half an inch deep and half an inch wider on each side than the first part. The second part is a slot for the cover, which is fitted, placed and screwed down after the cable is fastened in position. This cover is made flat on the under side, but rounded off on the outside, so as to correspond with the shape of the rest of the pole. A narrow trench from three to four feet deep should be dug from the butt of each terminal pole to low water mark for burying the exposed portion of the cable as soon as laid.

The best kind of a vessel from which to lay a river cable is a small steam tug-boat drawing but little depth of water. The cable reel should be taken on board the boat and mounted on a strong framework, which is securely fastened to the deck, as shown in Fig. 1. This should be provided with two strong brakes, one at each end, to regulate the revolutions of the reel and correspond with the speed of the boat. The brakes can be applied directly to the axle, to the end or edge of the reel, or to any other place where they can be made to exert sufficient pressure to control the motion of the reel. The boat is backed in toward the starting bank and kept stationary while one end of the cable is being pulled ashore and made secure to the pole or some other object strong enough to hold it. The boat is then started slowly, the man attending the reel in the meantime giving it a few turns until the motion of the boat and the strain of the cable reach it gradually. The boat is now headed for the opposite shore, keeping as straight a line as possible. The men attending the reel should always have it under full control, keeping sufficient pressure on the brakes to string out the cable in a straight line without kinks, and yet with sufficient slack to let it at once reach the bottom. The most critical time is when making the second landing. Unless carefully watched, the sudden stoppage of the boat will throw some slack into the cable, and after she reaches the bank she is apt to swing around and foul it. This should be guarded against by the proper use of the brakes. The boat should be made fast and kept in one position as soon as she reaches the bank. The cable should be secured by a half hitch of a rope where it passes over the bulwark so that no slack can go into it beyond the stern of the boat. The balance of the cable is now unwound from the reel and placed in large coils on the deck until the end is reached. The end is now carried on shore and pulled up through the trench to the terminal pole, one or two men always watching the straightening out of the reserve coils on deck. When it is all taut and in position between the boat and pole, the line which held it at the bulwark is taken off and it is thrown into the river, clear of the boat's propelling and steering gear. It is now put in position and connected at each terminal pole, and the trenches are filled up and tamped. Good lightning arresters should be placed in these boxes to prevent any heavy charge from entering the cable. The best of grounds can be obtained for this purpose by connecting the ground plate with the armor of the cable.

The cable poles should be placed on high dry ground if possible, out of reach of tides and high water from freshets. When the river banks are low, and the butt of the pole is liable to be surrounded for a considerable time with back water, and be subjected to injury from drifting ice and wood, it should be surrounded by a stockade of heavy timbers, planted some six or eight feet deep, and connected together by iron bands, Fig. 2. As a further protection, the space between this stockade and pole may be filled with heavy rocks.

Whenever a navigable river is crossed by a bridge, it is only necessary to cable the draw-span, providing permission can be obtained from the bridge company to place wires on the rest of the structure. In this case the cable boxes are attached to the bridge on each side of the draw span, and where they will not be in the way of the swinging part. The cable can be stretched out on the draw part of the bridge, secured at each end and the bight thrown over the railing and allowed to sink in the water. Even in this case it will be better to use a boat, and lay the cable with considerable slack, and at quite a distance from the pier, so that it will be sure of reaching the bottom. The stone foundations of these piers extend for some distance from the bridge, especially in the direction of the current. If the cable is laid close up to the bridge, it will remain suspended across the channel, between these two piles of stone, and be broken by the first vessel passing through.

Cables across canals are laid in the same manner, and with the same precautions, as across rivers.

All cable boxes, whether for aerial or river cable service, should be rain proof if possible. All joints in the lumber should be put together with white lead. The box, when finished, should get two coats of paint. It should then be covered all over with zinc or strong tin and get

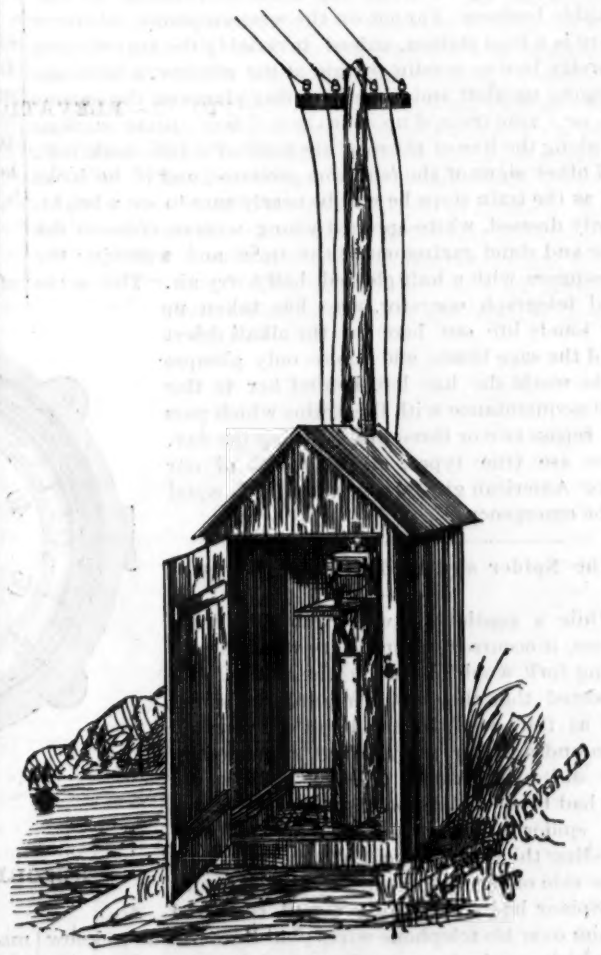


FIG. 3.—CABLE HOUSE BESIDE RIVER BANK.

another coat of paint. The manner of locking should be so arranged as to prevent any moisture from entering the box. Sometimes when a number of cables, each containing several conductors, cross a river, it is difficult to make room for them all within the compass of a cable box. In such cases a small house is built around the butt of the pole, Fig. 3. This affords much convenience for testing the cables, as a switch-board and a set of instruments can be left permanently in the house.

Zenas F. Wilber, according to Denver papers, is now in that city as the guest of Major M. D. Van Horn. He has been living under an assumed name, "for the reason that he wished his whereabouts kept secret from the detectives and others who are representing the interests of the Bell Company." It is said to be his intention to travel in the West during the summer and then attend the hearing of the government suit against the Bell patents.

A Woman's Presence of Mind.

A special dispatch of June 19 from New Orleans says: Last night at 9 o'clock Miss Childress, night operator at the Crescent City Telephone Company's exchange, was startled by a flame which suddenly burst out all over the switch-board, and almost at the same moment the vivid flashes of electricity lighted up the pole at the corner of Common and Carondelet streets. Knowing at once that the electric light had come in contact with some of the telephone wires, and as it was of unusual force, the young lady with judgment and courage rushed behind the switch-board into the electric department, where there is an innumerable labyrinth of wires, and severed the hundreds of small shunt wires which connect the cables and outside wires through the lightning arresters with the switch-board system. This at once cut off all communication between the exchange and the electric light, and although great damage had already been done to the spools, annunciators and wires on the inside, it stopped all further damage and saved the exchange. The Insurance Fire Patrol was notified and promptly responded, and the fire was extinguished. The company's electrician gathered an extra force of repairers, so that by daylight the hundreds of broken and burned wires in the exchange were all restored, and the spools, annunciators and relays damaged were all replaced by duplicates which were kept on hand for an emergency.

Women as Telegraph Operators.

There evidently is one kind of business for which women seem to be well fitted, judging from the number engaged in it, says a writer in the New York *World*, and that is telegraphy. Strolling about the city and dropping into almost any telegraph office from Harlem to the Battery there may be seen the female operator, and, as a general thing, she will be seen to be young and pretty and wide-awake to her business. She will sometimes have about her a number of subordinates of the opposite sex in the form of callow youths and messenger boys, over whom she queens it with a right royal will and an air of authority that is charming to behold. Generally these young women are very pleasant and obliging; only occasionally will one come across a terror, whose very look will freeze him to the marrow. However, they all seem to give satisfaction to their employers and to attend well to their work, and appear to be rapidly monopolizing the telegraphic business. Far out on the western plains, wherever there is a road station, almost invariably the traveler sees a pretty lace or muslin curtain at the window, a bird cage hanging up aloft and some flowering plants on the narrow sill, or a vine trained up over the red door (these stations all along the line of the road are painted a dull, dark red), and other signs of the feminine presence, and if he looks out as the train stops he will be nearly sure to see a bright, neatly dressed, white-aproned young woman come to the door and stand gazing out at the train and watching the passengers with a half-pleased, half-sorry air. This is the local telegraph operator, who has taken up her lonely life out here on the alkali desert amid the sage brush, and whose only glimpse of the world she has left behind her is this brief acquaintance with the trains which pass and repass two or three times during the day. These are true types, all of them, of our brave American girl, whose courage is equal to the emergency.

The Spider and its Telephone Wires.

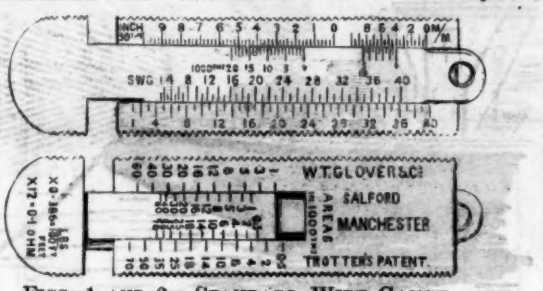
While a gentleman was watching some spiders, it occurred to him to try what effect a tuning-fork would have on the insects. He suspected that they would regard the sound just as they were in the habit of regarding the sound made by a fly. And, sure enough, they did. He selected a large, ugly spider that had been feasting on flies for two months. The spider was at one edge of its web. Sounding the fork, he touched a thread at the other side of the web, and watched the result. Mr. Spider had the buzzing sound conveyed to him over his telephone wires; but how was he to know on which particular wire the sound was traveling? He ran to the centre of the web very quickly, and felt all around until he touched the thread against the other end of which the fork was sounding; then taking another thread along, just as a man would take an extra piece of rope, he ran out to the fork and sprang upon it. Then he retreated a little way and looked at the fork. He was puzzled. He had expected to find a buzzing fly. He got on the fork again, and danced with delight. He had caught the sound of the fly, and it was music to him.

It is said that spiders are so fond of music that they will stop their spinning to listen; and a man once said that when he retired to his room for quiet before dinner and played the flute, large spiders would come on to the table and remain quite still, "running away as fast as their legs could carry them" directly he had finished.

Glenwood Springs, Col.—Mr. G. H. Taylor, of Denver, has been granted pole-line franchises and other rights of way for furnishing electric light.

Standard Wire Gauge.

In March of last year we brought to the notice of our readers a new wire gauge designed by Mr. A. P. Trotter and based on the English standard sizes as fixed by the act of 1883, and we revert to it again in order to mention several valuable improvements which have been effected in it, and which render it of much greater value to electricians. In its present form the gauge, as shown in Fig. 1, will register the number of any wire up to No. 1. (.300″) S. W. G. (Standard Wire Gauge); formerly it only read up to No. 6 (.192″). In addition to this valuable extension the area scale by which the current for any size of copper wire can be calculated has been enlarged, and whereas it only registered the areas in thousandths of a square inch up to .030 square inch it now gives them up to .070 of a square inch, as shown in Fig. 2. We illustrate this scale of areas and draw attention to it on account of its usefulness for calculation. In the first place,



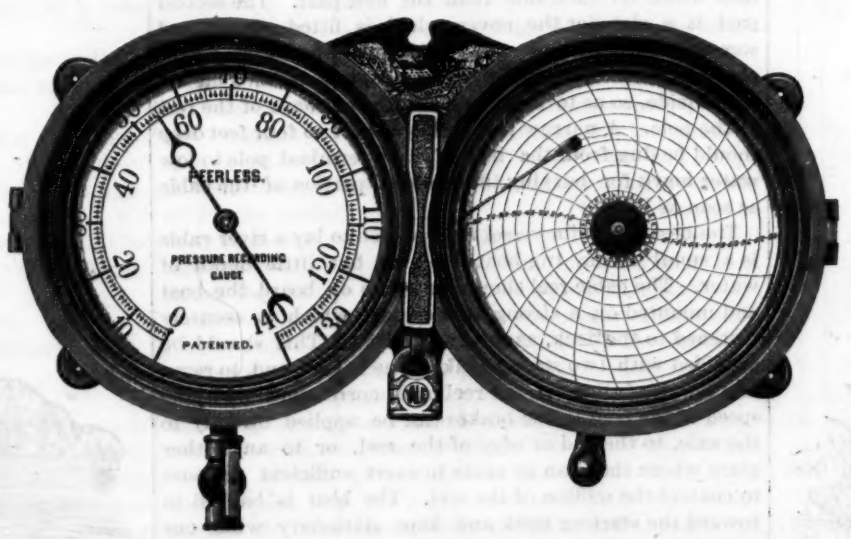
FIGS. 1 AND 2.—STANDARD WIRE GAUGE.

if the current be taken as 1,000 ampères to a square inch of copper, then this scale of areas may be taken as a scale of ampères direct; but if it be decided to transmit at the density of 2,000 ampères to the square inch, then all that is necessary is to multiply the area by 2. Again, if the area figures be multiplied by 0.4 (more accurately, 0.386), it will give the weight in pounds per 100 feet of the wire measured; while by multiplying the area by 12, we have the length in feet of copper wire having a resistance of one-tenth of an ohm. By multiplying the area figures by 0.323, we get Sir Wm. Thomson's rule of 0.5 ampère to a square millimetre. Again, multiplying by 0.0575, we get horse-power lost per mile with 1,000 ampères to the square inch. The number 42.8 divided by the area gives the resistance in ohms per mile, while the area multiplied by 20.35 gives the pounds per mile.

This little instrument is one likely to supply a want of electricians generally, as anything that saves time and facilitates prompt and accurate calculations cannot be other than of value in these days of high pressure. The gauge is both novel and useful. It is manufactured by Walter T. Glover & Company, Salford, Manchester, England.

Recording Gauge for Electric Light Stations.

Uniformity of action in dynamo machines and economy of fuel in electric light stations demand that the steam be



RECORDING GAUGE FOR ELECTRIC LIGHT STATIONS.

maintained at a uniform pressure. In order to enable those in charge to determine whether the attendants have performed their duty faithfully, Mr. S. P. Jones, of Boston, Mass., has designed the recording gauge shown in the accompanying illustration. This leaves a written chart on record of all variations in pressure during the entire 24 hours, and shows the time of any variation and its duration. The Bourdon spring is employed in this gauge, and the intervals of pressure are exactly alike. The gauge runs three days, and does not require to be unlocked when rewound.

Formulæ on Magnetic Moment.*

Let us suppose that some one wishes to solve the following problem:—

Given an iron-cylinder (for example, the branch electro-magnet of a dynamo machine) of a certain diameter and length and with a certain number of windings of wire, what is the magnetic moment (when saturation is reached) which will be developed by a current of so many ampères?

The magnetic moment in such a case is difficult to determine from the laws and experiments given in the treatises of those experimenters who have occupied themselves with the subject.

In the calculation of the answer to the above question, one would have to consider:

I. The variation of the magnetic moment with the product of the number of windings and the strength of the current.

II. The (according to Dub) direct variation of the magnetic moment with the square root of the diameter,

III. The (also according to Dub) effective variation in cases of this kind with the $\frac{5}{6}$ power of the length of the bar.

The practical usefulness of the empirical formulæ at the command of electro-magnetism has hitherto been so small that you find among practical men little estimation for these dogmas of science, and the reason is that the constant co-efficients in the formulæ have not been determined. The formulæ which represent the empirical laws of Lenz, Jacoby, Müller and Dub contain factors which universally consist of functions of the dimensions of the bar and constants. But the required constant factors have not yet been ascertained.

The three laws given above are represented by the formulæ

$$y = C\,x$$
$$y = c\,\sqrt{d}\,x$$
$$y = m\,l^{\frac{5}{6}}\,x$$

where y is the moment of the magnet, d the diameter of the bar, and l its length.

The latter two formulæ may be reduced to the single one

$$y = k\,\sqrt{l^5}\,d\,.\,x$$

To eliminate the constant k we must make an experiment which will give us the moment y', which a certain bar of length l' and diameter d' acquired when it was magnetized by means of a coil of n' windings, through which passed a current of i' ampères. We shall then have the relation

$$\frac{y}{y'} = \frac{\sqrt{l^5}\,d.n.i}{\sqrt{l'^5}\,d'.n'.i'}$$

and can hence determine y.

To render this experiment unnecessary for the practitioner to make, the author by various sets of experiments which have been published has determined k, for which he gives as a rough value 0.135.

Thus we have

$$y = 0.135\,\sqrt{l^5}\,d\,.\,n\,.\,i.$$

But this formula is only true till saturation is attained. The author's experiments on the magnetizability of iron and steel give the magnetic maximum—that is, the highest attainable magnetization in a field of infinitely great intensity, as 212.5 units of the C. G. S. system per gramme. Accordingly, the magnetic moment of an iron cylinder of length l, and of thickness d (given in centimetres), when magnetized to saturation, is

$$y' = 212.5 \times \frac{\pi}{4}\,ld^2 \times 7.78$$

if the specific density of iron is taken as 7·78.

The quotient of the actual magnetic moment present by the magnetic moment thus calculated, or $\frac{y}{y'}$, the author has called the "degree of saturation."

* Abstract of a paper by Dr. A. v. Waltenhofen in the *Centralblatt für Electrotechnick*.

The Present and Future of Electric Power.

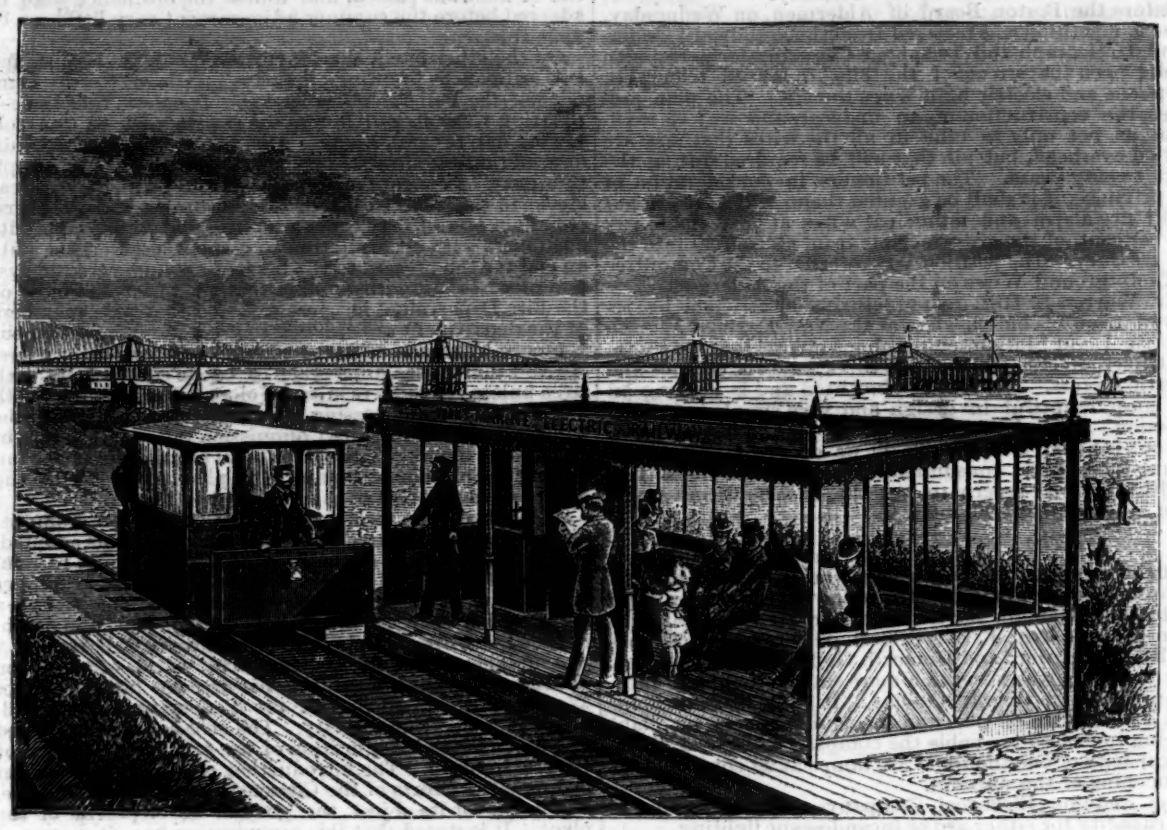
To the Editor of The Electrical World:

SIR: I have read the report of Mr. C. J. H. Woodbury's testimony before the Street Railway Committee of the Massachusetts Legislature. Now, it would seem to me a little more satisfactory to the public if he would publish the cross-examination. What was published must have been his own account. Mr. Woodbury admitted afterward that he was sent there by interested real estate owners as a paid expert to assist in killing off the application for an electrical elevated railroad. He admitted that he had never seen any of the electrical railroads in operation. The success of the use of electricity as a motive power for running railways in Europe and this country is now beyond a question, and paid experts cannot kill them off. The success of the electrical railway is sure. It is in much better shape than electric lighting was in 1880. The success of the Van Depoele system in running cars at Minneapolis, Appleton, Wis., and Montgomery, Ala., shows what can be accomplished. If they have succeeded in doing so much to start with, what will be the result a few years from now? Let Mr. Woodbury look back to 1878 and recall the abuse that was showered down on the electric light by gas men and others. One of its strongest opponents, a superintendent of a gas company, informed me then that electric lights would never pay, and that every plant put in was a swindle on the stockholders and public. *He is to-day putting in an electrical light plant in his gas works.* The advance of the use of electricity is forward, not backward, and he who stands in the way will get left.

PROGRESS.

The Brighton, England, Electric Railway.

A few weeks ago we gave a description of the successful electric railway at Brighton, England, now operated for two years by Mr. Magnus Volk. We are now enabled to give an illustration of the road, taken from *La Lumière Electrique*. The plant of this line comprises two cars fitted with motors, one 8 h.-p. gas engine,



THE VOLK ELECTRIC RAILWAY, BRIGHTON, ENGLAND.

one 12 h.-p. gas engine, one Siemens D 2 series dynamo and one Siemens D 2 compound dynamo. The line is not quite a mile in length, speed is limited to eight miles an hour, and each car carries thirty passengers, the motor being equal to another car if necessary. Current is transmitted along the rails. The road pays. Other points will be found in our issue of June 12.

The Cuttriss Siphon Vibrator for Ocean Telegraph Cables.

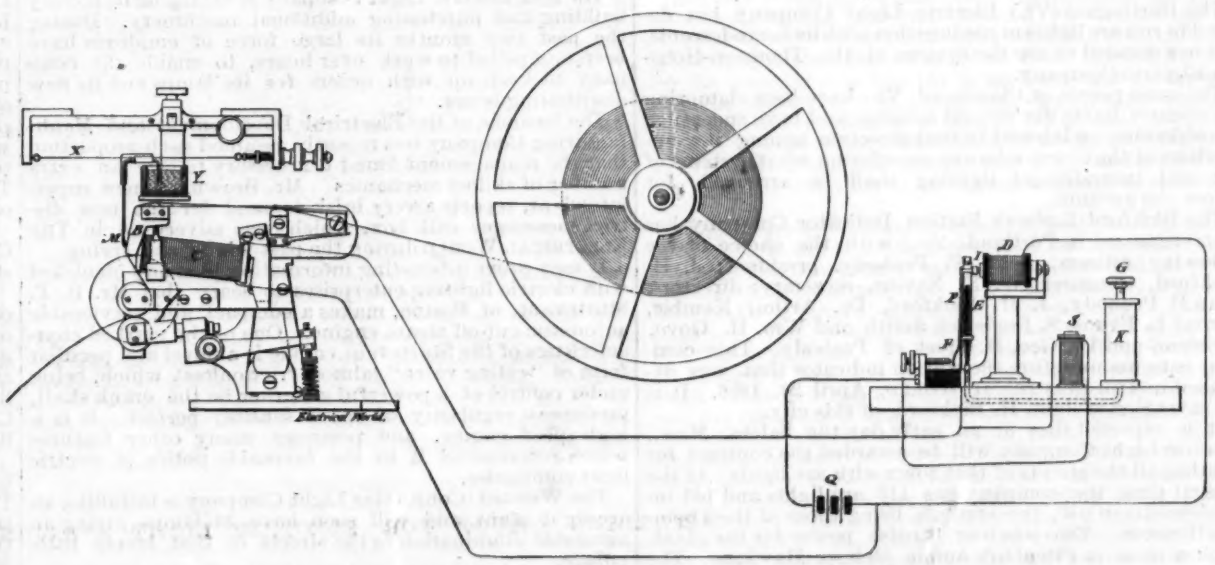
The use of static electricity to vibrate the siphon, with the object of preventing friction at the marking point of Sir William Thomson's siphon record, has always been the one defect in this otherwise most perfect and beautiful instrument; for, as is well known, in damp weather, static electricity is difficult to produce and well nigh impossible to control. In such weather the operator working an electrified ink recorder must generally be confined in a room with all windows and doors closed, and frequently lamps or some other sources of artificial heat are placed around the instrument to keep it dry, in order to prevent the escape of electricity. It is necessary to take this precaution, even in the hot and sultry weather of August. The paper on which the record is to be traced must also be kept in various places from cellar to garret, and oftentimes other means are resorted to so that it may be of different grades of moisture; for if the paper be too dry the electrified siphon oscillates wildly across it in its endeavor to discharge itself, while if it be too damp the siphon is discharged too effectually and the record fails.

The present invention, recently patented, obviates all this trouble by the use of magnetism, and the instrument works just as perfectly be the weather damp or dry. By reference to the accompanying illustration it will be observed that the siphon *M* is slightly thicker toward the point; this is caused by a small particle of iron wire, No. 30 or 32, about $\frac{1}{16}$ or $\frac{3}{32}$ of an inch in length, fastened to it by a little shellac varnish. The magnetic recording table *B*, opposite the point of the siphon, over which the paper slip passes, is made partly of iron, and to the back of it is attached the electro magnet *C*. The addition of this magnetic table is all the alteration necessary to any recorder in order to enable the present system to be used.

The principal part of the invention is the adjustable vibrator at the right of the illustration. The glass tube *E* and armature *I*, which are supported by the steel rod *P*, are vibrated by an electro-magnet *D*. Continuous vibration is maintained by means of the battery *Q* and the contact points *F*. The upright mercury reservoir *K* has a regulating screw *G*, the lower end of which is made to act as a plunger; a small india rubber tube connects the mercury reservoir with the glass tube *E*, so that by raising or depressing the plunger the mercury can be forced and maintained at any required height in the glass tube, and by this means its rate of vibration can be changed as may be required. Whenever a new siphon is attached to the instrument it may become necessary to alter the rate of the vibration owing to the fact that even so delicate a tube as one of these siphons (which is about .01 of an inch in outside diameter), has its own natural rate of vibration, depending upon its weight, thickness, and the amount of strain upon the wire supporting it; therefore, the impulses it receives from the magnetic table must be synchronous with its natural rate of vibration, otherwise the record will fail. When a siphon is attached to the strained wire *X*, and it has become filled with ink from the ink reservoir *Y*, the plunger is manipulated until the siphon attains its maximum arc of vibration. A perfectly steady dotted line is then obtained and will continue without any other regulation so long as it remains filled with ink.

Generally a permanent steel magnet is arranged so that one pole is opposite the magnetic table, and at about a distance of half an inch from the siphon. This concentrates the lines of magnetic force in such a way that all the battery required is three gravity cells of low resistance. The contact points *F* have a spark-arresting coil *S* connected to them, so that in practice they have given no trouble, and during the two months that the instrument has been in use on the Commercial Cable Company's recorders in this city not a single failure has occurred in their action.

It was feared that the siphon might show a tendency to be attracted laterally toward the centre of the magnetic table, but such is not found to be the case. No lateral movement can be detected, whatever be the position of the siphon when the battery circuit is broken and the table demagnetized; nor is there the slightest retardation experienced to its lateral movements across the magnetic field. In fact, the success of the invention is so pronounced that the company is about to adopt it on all its cables as soon as instruments can be made. There is a wide field for the introduction of this system, as it can be applied to any delicate mechanism of whose movements it is desirable to take a permanent record.



THE CUTTRISS SIPHON VIBRATOR FOR OCEAN CABLES.

Electrical Appliances in the Home.

Probably no other residence in New England has been more conveniently fitted with electrical apparatus of nearly every kind, says the Worcester *Gazette* of June 5, than has the elegant home of Mr. William H. Slater in Norwich, Conn. The wires for the several systems were put in last July, while the work of putting in the electrical fitting was begun the first of last April, and it is now almost completed. Messrs. Reed & Page, electricians of this city, are doing the work through Messrs. Norcross Brothers, contractors, also of this city, and their several systems being subject to the approval of Mr. Stephen C. Earle, architect, of this city, who has the supervision of the entire rebuilding and furnishing the mansion. Messrs. Reed & Page do not hesitate to join the other artists, whose work in and about the residence is of the best possible, in subjecting their electrical appliances to the closest scrutiny and the severest practical tests by those who are familiar with the uses of electricity for home convenience and ornamentation. They have been assisted very much in making their work so successful in its operation by Mr. K. D. Chapell, the foreman at the house for the Messrs. Norcross Brothers, who carefully made various provisions while the house was undergoing repairs with a complete net-work of wires throughout the building. The electric gas-lighting is so arranged that no matches need be used in the main building, thus removing all danger from fire by their use. A novel arrangement is the lighting of the shaft, 9 × 14 feet, which is situated over the main stairway about 30 feet above the lower floor. Around this shaft are twenty electric, automatic gas burners, with reflectors above them to throw the light, when used at night, down through the colored glass, which is put in the form of a canopy, to the stairs and halls below. These burners are lighted by simply pressing a button at the newel-post on the tower stairway, which starts a set of mechanism located in a closet on the lower floor, some fifteen feet away, and makes electric connections with each burner in rotation until the twenty are lighted. To extinguish the lights another button at the same place is pressed and another set of mechanism, located with the other, is started and the lights go out in rotation. This mechanism will light and extinguish these 20 burners automatically 18 times with one winding, requiring but 15 seconds to light them. It was made by Messrs. Reed & Page especially for Mr. Slater's house, and is an ingenious and practical piece of workmanship, and they state that, to their knowledge, none are in use for a like purpose elsewhere in New England. Fully 200 persons witnessed its workings in their store when exhibited before it was sent to Norwich. In nearly every room and hallway are placed the electric automatic burners with gold-plated keys for lighting and putting out. Also the chandeliers and brackets are fitted with electric ratchet pendant burners. The electric burners, used by them exclusively in all their gas or gasoline work, are the Boston Electric Company's make. The several lines of tin speaking tubes connecting the main rooms and halls and kitchen have covered gold plated mouth-pieces, as are also the push buttons in all the rooms connecting. Then there are buttons in the rear main lobby connecting with electric bells at the gardener's cottage, the green-house and barn. They have made their work in this house one of the most carefully executed systems that they have ever undertaken, and do not hesitate to warrant it as perfectly satisfactory (though quite a distance away) as they do with all their work. Mr. George W. Barnes, one of their electricians, had charge of this work.

Fair and Independent Journalism.

To the Editor of The Electrical World:

SIR: I notice in your issue of 19th, just at hand, an editorial on my induction telephone repeater just patented.

As this was entirely unsolicited by me, and your notice is entirely gratuitous on your part, seeing that I have not been an advertiser in your paper, I appreciate the more thoroughly the spirit with which you promulgate advanced ideas and new improvements in electrical service for the good of the public as your only apparent motive.

I have learned to appreciate your journal by the fair, independent and public spirit you indicate through its pages.

NEW YORK CITY. SIDNEY F. SHELBOURNE.

NEW YORK NOTES.

OFFICE OF THE ELECTRICAL WORLD,
NEW YORK, June 21, 1886.

The spread of the Edison system of incandescent lighting has been such as to bring a number of local companies into existence, and the managers of these have come to feel the necessity of forming an association for mutual help in the dissemination of information and the exchange of views. Such an association has, in fact, been quietly at work for some little time, and its second meeting was held on June 9 at the Hotel Brighton, Atlantic City. There were present twenty representatives of Edison companies in various parts of the country, and a pleasant time was had. The following members were elected as officers for the ensuing year: President, John I. Beggs, General Manager Harrisburg (Pa.) Company; secretary, J. H. Vail, Superintendent Edison Company, New York; treasurer, Wilson S. Howell, Superintendent New Brunswick (N. J.) Company. The following form the Executive Committee: J. I. Beggs, P. B. Shaw, Williamsport, Pa.; J. S. Hambird, Cumberland, Md.; W. D. Dwelly, Fall River, Mass.; F. S. Gorton, Chicago, Ill.; and J. H. Vail. Another meeting will be held during the second week in August.

I find an unusual interest among electricians as to the electric fountain that will play this season at Mr. Wiman's Staten Island pleasure resort. I venture to predict that the fountain will be the seaside sensation this year. I understand that with our customary American desire to "go it one better" than anybody else, Mr. Wiman has had Sir Francis Bolton's London fountain plans considerably enlarged and improved.

An interesting exhibition in signaling was given down the bay a day or two ago by Gen. Molineux, with some officers and men of the National Guard Signal and Telegraph Corps. The object of General Molineux in taking the corps down the bay was to drill them in long-distance signaling. He said signals had been flashed seventy-three miles by means of mirrors. The first thing an intelligent mob would do would be to cut telegraph wires, gas pipes, and, finally, water mains. By the use of code signals, a few men could, from the tops of prominent buildings in New York and Brooklyn, keep troops in communication with headquarters. In illustration of this, squads were detailed to the bow and the stern of his boat. White flags four feet square, with centre containing a square of red, were fixed to jointed staffs. These were waved about in what seemed a reckless manner, and elicited responses from the two forts. The flag at Fort Wadsworth was similar to those on the steamer, but that on Fort Hamilton was red with a white center. Although the sides of the triangle were over three miles long, the motions of the flags were plainly distinguishable. In order to transmit the signals the man manipulating the flag dipped it a certain number of times to the right or left, or down in front. Thus the letter A is made by waving the flag twice to the left; N, twice to the right; B, once to the left, twice to the right, and again to the left. Signals were transmitted back and forth to either fort, and from Fort Wadsworth to Fort Hamilton, and thence to the steamer with quickness and accuracy. The men were then called in, and as the tug approached the Fort Hamilton pier, Captain Leigh signaled with the steam whistle, using the Morse telegraphic system, "To all—You have done well."

W. T. H.

NEW ENGLAND NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
BOSTON, Mass., June 18, 1886.

The Burlington (Vt.) Electric Light Company has decided to run arc lights in conjunction with its incandescents, and has decided to use the system of the Thomson-Houston Electric Company.

The good people of Claremont, Vt., have been clamoring for electric lights for several months, and have succeeded in awakening an interest in that direction among the authorities of the town, who are considering what systems of arc and incandescent lighting shall be arranged for before the autumn.

The Bickford Railway Station Indicator Company has been organized in Portland, Me., with the choice of the following officers: John P. Peabody, president; J. H. Bickford, treasurer; W. S. Nevins, secretary; directors, John P. Peabody, J. H. Bickford, Dr. Arthur Kemble, Forrest L. Evans, S. Frederick Smith and Wm. H. Gove, of Salem, and Dr. Geo. M. Frost, of Peabody. This company is to manufacture the station indicator that was described in THE ELECTRICAL WORLD, April 24, 1886. It is the invention of John H. Bickford, of this city.

It is reported that at an early day the Salem, Mass., Electric Light Company will be awarded the contract for lighting all the streets of that town with arc lights. At the present time the company has 115 arc lights and 140 incandescents in use, the systems being those of the Thomson-Houston. Two engines furnish power for the plant, viz.: a 75 h.-p. Fitchburg and a 60 h.-p. Hawkins. The company was incorporated in 1882; its capital is $40,000. The officers are: Chas. H. Price, president; H. M. Batchelder, treasurer; and A. Morrill, superintendent.

A dispatch from Portsmouth, N. H., under date of June 14, states that an electric light company is being organized there consisting of some of the wealthiest men of that city. Ground will be broken at once for a large and perfectly equipped plant.

From Manchester, N. H., comes the report that the Benjamin Franklin Electric Light Company has received a permit from the city authorities to erect poles and run wires in any part of the city.

It is said that an old telegraph cable is to be repaired and relaid between Woods Holl, Mass., and Vineyard Haven, Mass., thus affording Martha's Vineyard the benefit of two cables to the main land.

The Armington & Sims Engine Company, of Providence, R. I., has just shipped an engine of 150 h. p. to the Cocheco Mfg. Company, Dover, N. H., this being the second engine of the make purchased by the latter company.

If sales are any indication, the Hennessy boiler is growing in popular favor. It is made by the R. F. Hawkins Iron Works, Springfield, Mass., who recently filled orders including a 100 horse-power boiler for the Morgan Envelope Manufacturing Company, Springfield; similar ones to the Thomson-Houston Electric Light Company, Northampton, and the Merrick Thread Company, Holyoke, while a 40 horse-power has been sent to the Franklin County courthouse at Greenfield.

Prof. Geo H. Hartwell, of Boston, delivered an interesting lecture on "Civilized Electricity" before the Young Men's Christian Association, Chelsea, Mass., on Thursday evening, June 10th. The subject was comprehensively treated, and was illustrated and explained with the aid of stereopticon views, together with practical demonstrations made with various electrical apparatus. This was the last lecture of the season of Professor Hartwell's popular series of discourses on electricity.

Before the Boston Board of Aldermen, on Wednesday, June 9, a petition was received from the Woodward Underground Telegraph and Telephone Company for permission to dig open the streets of the city to lay all telegraph, telephone and electric light wires therein. The plan proposes the construction of an underground way so capacious as not only to take in all the wires that now are carried overhead, but all that will be required during the next twenty years. The petitioners in consideration of the privilege, if it shall be granted them, will agree to put in all fire-alarm and municipal wires at cost and to pay one per cent. of the gross receipts from all sources into the city treasury. The petition was referred to the Committee on Underground Wires on the part of the Aldermen.

Mr. Warren S. Hill, manufacturing electrician, has removed from his old quarters at the New England Weston Electric Light Station, on Stanhope street, Boston, to No. 133 Oliver street. He manufactures small dynamos and electric motors. Mr. Hill has invented and is making an arc lamp, beautiful in design and very simple in its construction. It works without a dash pot, and its automatic cut out is novel and reliable in its operation. Arrangements have been consummated with a prominent and wealthy Boston concern to put this new lamp and a new form of dynamo on the market.

BOSTON, Mass., June 21, 1886.

At the recent annual meeting of the Merchants Electric Light and Power Company the following gentlemen were elected as officers for the ensuing year, viz.: Col. Silas S. Gurney, president; F. A. Gilbert, vice-president; James English, treasurer; and Homer J. Goff, general manager. This company was never in a more satisfactory and prosperous condition than it is to-day. It has nearly six hundred arc lights in service, and the equipment of its plant is being increased to enable the company to have a lighting capacity of one thousand arc lamps at its command at the opening of the autumn.

The Redding Electrical Company makes dynamos of any capacity for either arc or incandescent lighting.

The Tarbox Time Register Company is daily in receipt of orders for its electric watchman's clock.

Among the delightful attractions at the summer bazaar in Mechanics' building, this city, are the fifty arc-lights, which find great favor among the habitués of that popular resort.

Messrs. Blodgett Brothers & Company are making all sizes of gravity drop annunciators in large quantities, and are supplying many leading electrical houses with this line.

The New York Insulated Wire Company, having offices in this city, New York and Chicago, is doing a heavy business in supplying the trade with its Grimshaw patent tape, as well as aerial and underground wires and cables of various sizes and lengths.

The Jarvis Engineering Company reports the filling of numerous orders recently for the Armington & Sims engine, for which it is the selling agents in the New England States and Canada.

The Eastern Electric Cable Company has recently made large sales of its product of electric light cables to quite a number of electric light companies in New England and the Dominion.

The Sun Electric Light Company is enlarging its factory building and purchasing additional machinery. During the past two months its large force of employés have been compelled to work over hours, to enable the company to keep up with orders for its lamps and its new distributing boxes.

The business of the Electrical Development and Manufacturing Company has recently assumed such proportion that the management found it necessary to hire an extra number of skilled mechanics. Mr. Brown, the new superintendent, reports a very brisk demand for the new district messenger call box, which was advertised in THE ELECTRICAL WORLD during the past winter and spring.

It may prove interesting information to many identified with electric lighting enterprises to learn that Mr. B. F. Sturtevant, of Boston, makes a compact and serviceable automatic cut-off steam engine. One of the marked characteristics of the Sturtevant engine is a novel and peculiar form of "riding valve" (almost frictionless), which, being under control of a powerful governor on the crank shaft, produces a regularity of speed sensibly perfect. It is a high speed engine, and possesses many other features which recommend it to the favorable notice of electric light companies.

The Winsted (Conn.) Gas Light Company is installing an arc-light plant, and will soon have 24 lamps giving an agreeable illumination in the streets of that lovely little village.

The electric light plant at Malden, Mass., is nearly finished, and it is expected that lights will be ready by July 15. Subscriptions have already been received for nearly fifty arc lamps, which can easily be increased to the neighborhood of one hundred.

Mr. E. H Lord, the courteous treasurer of the Lawrence (Mass.) Edison Electric Illuminating Company, reports that his company has commenced lighting the entire city with the Municipal system of incandescent lighting, having displaced every gas and oil lamp. About 500 lamps of the Municipal system are now in use, which will be gradually increased. The company has 3,500 domestic (or isolated) incandescent lamps in use in Lawrence, giving thorough satisfaction.

The Somerville, Mass., Electric Light Company is now being organized at Nashua, N. H., and will be composed of a number of the leading and wealthiest citizens of the former town. It is reported that the capital will not be less than $100,000. Both arc and incandescent lights will be used.

A dispatch from Exeter, N. H., under date of June 16, gives the following: "The Frenyear and Razee Company has just closed a contract with a company of prominent Portsmouth (N. H.) business men to supply that city with an electric light plant of the Pfannkuche system, which is manufactured by the former. The outfit will include 35 arc and 375 incandescent lights."

W. I. B.

PHILADELPHIA NOTES.

BRANCH OFFICE OF THE ELECTRICAL WORLD,
PHILADELPHIA, June 21, 1886.

Although a committee of the City Councils have agreed upon a reasonable measure prescribing general regulations for the laying of underground conduits, the Councils still neglect to take action upon that subject. Already one half of the season during which such work can be done has passed, and unless the ordinance shall be adopted before the summer adjournment very little can be done this year.

On the other hand, the Mayor, on Monday last, signed two ordinances granting extensive privileges to two companies—the Bell Telephone and the People's Telephone—to string wires in and across the streets, and on the following day favorable action was taken on another ordinance granting similar privileges to the Time Telegraph Company—a concern which proposes to furnish electrical clocks in the offices of railroads, insurance men, brokers, etc., at a cost of fifty cents a month, and thus supply its customers with accurate time at a small cost. This puts an end for the present to the hope of an underground system of wires, notwithstanding that the Chief Engineer of the Fire Department has just reported that the members of the Fire Department are exposed to great danger and inconvenience by reason of the overhanging electric light wires. He said that it was impossible to battle successfully with fires unless the ladders are used close to the buildings with the deadly current passing along the heavy wires. The Chief asked that the Fire Commission take some action in the matter tending to the enactment of an ordinance compelling the electric companies to place switches at the corner of each street so as to avoid the danger.

At a subsequent meeting of the Commission, Commissioner Furlong offered a resolution which was adopted, requesting the chief of the Electrical Department to compel the Brush and other companies to place proper switches on all electrical wires in the city. The switches are intended to throw the electric current from the neighborhood of a fire, thereby rendering the wires harmless.

A notable event in the electrical world occurred on Wednesday night last at the picturesque little town of Wayne, on the main line of the Pennsylvania Railroad, about 14 miles from the city. The occasion, already noted by you, was the inauguration of an extensive system of electric lighting. The introduction of this improvement is due to the efforts of the Citizens' Association of Wayne, which has for its object the general development of the place. It is stated that this organization has, at a cost of $20,000, constructed an electric light plant, with a capacity for furnishing 1,300 lights.

Up to the present time about 800 lights have been subscribed for and are now in use. Not only is nearly every house at Wayne illuminated by Edison incandescent lamps, but likewise all of the streets and the railroad station, leaving a surplus capacity for the growth of the place. The capital necessary to put the electric light into operation was, it is stated, all subscribed by residents of Wayne. Those interested in the project compose a stock company.

Ordinary sized cottages are each furnished with 16-candle-power lamps to the total of 100 candle-power for $30 a year, while 32-candle-power lamps to the total of 200 candle-power are placed in the larger dwellings for $50 a year. Its introduction at Wayne was duly celebrated there at the Hotel Belleview by a reception. Many ladies and gentlemen were present. The dancing hall was illuminated with six 32-candle-power lamps, and on the programmes was a miniature representation of an incandescent lamp.

It is proposed to extend the system to many other small towns near the city. While on this subject, I might mention the fact that a local paper claims that Philadelphia has the cheapest electric lights of any important city in this country except Rochester, where water power is used. The prices paid range from 45 cents in Rochester per lamp per night, to 91 cents in Los Angeles, Cal. Rochester is the only city supplied for less than 50 cents. Philadelphia pays from 48 to 59½ cents. Rochester not only has the advantage of water power, but makes contracts for long terms (three years), which helps to reduce the price. These statements will account for the growing popularity of the light in this vicinity.

In Camden, N. J., petitions are being circulated asking City Council to adopt the electric light on the principal streets.

At that favorite watering-place, Atlantic City, the "Incandescent Electric Burner Company" is just getting into operation. All wires introduced before June 1 were gratuitous; since that date the house or hotel pays. There are now 2,000 lights subscribed for. Of the hotels which have introduced the light is the Hotel Royal and the Chester County House. Many bedchambers in these houses will be illuminated with the incandescent burners.

A big fight between two rival electric light companies has just been decided by Judge Woodward at Wilkesbarre. The Wilkesbarre Electric Light Company were the plaintiffs, and the Wilkesbarre Light, Heat and Motor Company, the Excelsior Electric Company of New York, W. P. Ryman, Geo. D. Allen, John P. Cowling, Joseph Birkbeck, John G. Wood and J. J. Robbins, defendants.

The contention of the plaintiff (the original company there) was that a party of enterprising New Yorkers were building up a rival company on territory where they (the plaintiffs) had exclusive rights, and they prayed that an injunction be issued restraining the defendants, "their agents and servants, from furnishing electric light to the inhabitants of the city of Wilkesbarre, or any of them, and from interfering with the vested and exclusive rights of your orators in any manner." On Friday last Judge Woodward handed down a decision, filling two columns of a newspaper, and remarkable as a careful review of the law. The decision was that the old company's privilege was an exclusive one as against any other *corporation*, but not as against the common right of individuals. Therefore the injunction prayed for was granted as to the Excelsior Electric Light Company, of New York, and refused as to the individuals named—Messrs. Ryman, Allen, Cowling, Birkbeck, Wood and Robbins.

Owing to the success attending the electrical railway on Ridge avenue, in this city, its track is to be extended 2,000 feet to Laurel Hill Cemetery gates.

On Tuesday last bills in equity were filed in the United States Circuit Court on behalf of the American Bell Telephone Company, asking to have about a dozen individuals and firms enjoined from using telephones claimed to be infringements upon the complainant company's patents.

The post-office "Special Delivery" system, which it was thought might interfere with the District Messenger service, is on its last legs here. During the month of May only 5,322 letters were delivered by the special messengers in this city, a reduction of 400 letters from the preceding month. Only $423 worth of special delivery stamps were sold during May. When the service began, in October last, it required 100 boys, and upwards of 12,000 letters were delivered that month. Now there are only forty-four boys employed, and they are only kept busy a portion of the time.

Shaw & Geary, the manufacturing electricians, 53 and 55 North Seventh street, have a model factory and machine room. They undertake the construction of models and of practical devices of every kind. One of their new specialties is the vibrating electric gas lighter. It is a little beauty, and lights without fail. The vibrator is brought in contact with a weighted electrode, which performs automatically, and makes and breaks every time. The firm are making preparations to put these on the market at close figures. Those who wish to control territory for this lighter should get a sample and see about the matter at once.

Alfred F. Moore, 200-4 North Third street, is as busy as he can be in the insulated wire line. As general manager of the Electrical Construction and Maintenance Company, he is meeting with considerable success, and he feels quite elated at the adoption of the Brooks system by the Pennsylvania Railroad and the Lehigh Valley road. It has also been put in the mills of J. J. Glazier, Bro. & Co., the large hosiery manufacturers.

I find operators everywhere interested in stenography and typewriting, and in Philadelphia they enjoy the opportunity of availing themselves of the tuition of Close & Black, 1338 Chestnut street, who can show the highest testimonials in regard to the character of their work as practical reporters and teachers. Any of your readers desiring to study shorthand can feel perfectly safe in their hands. They have a fine school and also give instruction by mail.

Henry Carey Baird & Co., 810 Walnut street, have lately published one of the fullest, freshest and most valuable handbooks of the time, indispensable to any practical man. It is called the "Techno-Chemical Receipt Book," contains about 500 pages and 78 illustrations, and costs but $2. It will interest many to know that Dr. Wahl, the popular Secretary of the Franklin Institute, has taken part in the preparation of this admirable book.

J. E. Jeffords & Co., 1,480 Salmon street, Philadelphia, are making to order any size and style of porous cup wanted.

Mr. W. C. Crandell, 49 South Fourth street, is busily engaged on repair work and in various experimental matters of an electrical nature.

The Eureka Electric Company, 23-25 South Fourth street, P. J. Fitzgerald, general manager, and Henry G. Rees, consulting electrician, has excellent facilities for turning out arc and incandescent lamps and dynamos in any quantity. It makes a specialty of repairing, renewing and enlarging plants to order.

The Cleverly Electrical Works, 1018 Chestnut street, have a very neat engraved card showing a pretty girl lighting up one of their pendant burners. They make all kinds of electrical appliances. They produced lately a new arc lamp, which I am told works successfully.

Otto Flemming, 1009 Arch street, manufactures all sizes and styles of electro-medical instruments, cauteries, faradic, galvanic and faradic-galvanic batteries.

W. S. Abbott, 132 North Third street, and H. M. Sciple, 107 same street, both contract to furnish the steam power and supplies for electric light plants.

J. Chester Wilson, the general manager of the Clark Insulated Wire Company, says that business was never better. The company is sending out some large cables, and the factory is busy.

Tallman & McFadden, 1,025 Market street, have reduced the price of Stubbs' tools and supplies. They carry the fullest assortment of tools of any house I know. A catalogue will be sent in return for business card.

The Novelty Electric Company, of Fifth and Locust streets, is as busy as possible making up novelties for the trade. Circulars can be had relating to all their goods on application.

WESTERN NOTES.

ST. PAUL, Minn., June 19, 1886.

The fourth annual national convention of the Association of Railway Telegraph Superintendents was called to order at 10 A. M., June 16, in Parlor A, Ryan House, St. Paul, Minn., with C. W. Hammond, President, in the chair. Thirty-three out of forty-nine members were present and twenty-six States were represented, members being in attendance from Boston, Mass.; Houston, Tex.; Portland, Oregon; St. Louis, Mo.; Kansas City, Mo.; Cleveland, O.; Chicago, Ill., and other cities. Following are the names of those present, with names of the roads they represented: C. W. Hammond, President, Mo. Pac. R. R.; P. W. Drew, Secretary, C. & E. Ill. R. R.; G. L. Lang, Vice-President, N. Y. & N. E. R. R.; C. Selden, B. & O. R. R.; W. K. Morley, C. & Alton R. R.; H. C. Hope, C., St. P., M. & O.; O. C. Greene, N. P. R. R.; E. G. Russell, M. & St. L. R. R.; F. K. Holtzinger, Cornwall & Leb. R. R.; G. C. Kinsman, W., St. L. & P. R. R.; A. R. Swift, C., R. I. & P.; A. A. Honey, No. Pac. R. R.; L. A. Boyd, I., D. & S. R. R.; J. S. House, W., St. L. & P. R. R.; W. J. Holton, Chi. & W. I. R. R.; W. B. Jones, L. N. A. & C. R. R.; W. F. Carpenter, C. C., C. & I. R. R.; J. Cohen, H. & T. C. R. R.; H. C. Reid, M., L. S. & W. R. R.; J. S. Stevens, W., St. L. & P. R. R.; J. M. Shearer, C., V. & C. R. R.; G. M. Dugan, I. C. R. R.; N. C. Griswold, B. & O. R. R.; J. Q. Mason, T., P. & W. R. R.; G. E. Simpson, C., M. & St. Paul R. R.; C. S. Jones, I. C. R. R.; J. H. Hill, S. K. R. R.; S. A. Beery, C., W. & B. R. R.; G. T. Williams, N. Y., C. & St. L. R. R.; L. H. Korty, U. P. R. R.; L. F. Sheldon, Mo. P. R. R.; A. H. MacGregor, W., St. L. & P. R. R.; C. B. Davison, C., St. P., M. & O. R. R.; R. A. Hutchinson, D. & R. G. R. R.

According to the regular order the first business was the election of new members. The following were elected members of the association: J. M. Schearer, C., V. & C., Mount Carmel, Ill.; W. M. King, Q., M. & P., Quincy, Ill.; C. S. McHenry, E. & W. A. L., Delphos, O.; L. A. Boy, I., D. & S., Indianapolis, Ind.; W. B. Jones, L., N. A. & C., Chicago; C. Peterson, D. & B. C. Co., Honesdale, Pa.; G. W. Cutts, Chicago, Burlington & Northern, La Crosse, Wis.; R. B. Gennull, Atchison, Topeka & Santa Fe, Topeka, Kan.; J. Cohen, Houston & Texas Central, Houston, Tex.; G. M. Dugan, Illinois Central, Jackson, Tenn.; J. I. Mason, T., S. & W., Peoria; J. S. House, Wabash, St. Louis & Peoria, Springfield, Ill.; H. C. Reed, Milwaukee, Lake Shore & Western, Milwaukee, Wis.; L. H. Korty and J. J. Dickey, Union Pacific, Omaha; A. A. Honey, Northern Pacific, Portland, Ore.; C. B. Davison, Chicago, St. Paul, Minneapolis & Omaha, St. Paul; W. B. Blanton, E. & W., of Alabama, Cedartown, Ga.

On motion the reading of the minutes of the preceding meeting was dispensed with.

The report of the treasurer, who is also the association's secretary, was next read and approved. It is as follows:

Amount on hand	$ 25.95
Dues received	129.00
	$154.95
DISBURSEMENTS.	
Secretary's salary	$100.00
Printing and postage	41.02
	$141.02
Balance on hand	$13.93

Under the head of Reports of Standing Committees, the first report was from the committee appointed to prepare suitable operator's application and dismissal blanks. The application blank was first taken up. The committee reported on a blank which they thought would prove satisfactory, and which seemed to them to embody all the necessary interrogations.

In the discussion which followed, however, the matter was gone into very thoroughly. The principal provisions of the blank submitted by the committee were that the application should be in the applicant's own handwriting; applicant must be of good character, and must be a competent "sound" operator; and it also provided that the operator should be asked the questions, "Are you acquainted with the duties of a station agent, and what experience as such have you had? Are you acquainted with commercial work?"

Mr. Sheldon said that it often happened that the superintendent wanted a man at once to handle train orders, and that he thought they should be able to tell from the applicant's blank whether he was competent to handle the orders. A question embodying this was, therefore, added to the blank.

A motion was made that the name of the association be printed across the top of the application blank, and that this be followed by the name of the railway company using the blank. A general and protracted discussion followed this motion, during which it came out that there were two views as to how the blanks should be printed and issued. One opinion was that the name of the association should head the blank, that everything possible should be done to make it distinctively an association blank, and that for the sake of uniformity it should be printed and distributed under the auspices of the association and under the direction of its secretary. On the other hand, it was argued that if the above suggestions were adopted it would exclude the use of the blank from many roads, inasmuch as most of the roads, and these the larger ones, too, required that the blanks used in their telegraph department be one of a regular series, having their own particular tint and form number. It would be necessary, therefore, in order to insure the widest possible adoption of the blank, that the roads print the blanks themselves. After further discussion, it was finally decided that the form of blank adopted by the association be simply recommended to the railroad companies; that it would be better for the blanks to be printed by the railroad companies; that the name of the company be made prominent, and that the name of the association appear in the body of the application only. Then, after referring the blank back to the committee to be written out as a whole as amended, it was adopted.

During the preceding discussion, Secretary Phelps, of the St. Paul Chamber of Commerce, was introduced and said: "Gentlemen of the association, you represent the two great forces of the age—steam and electricity—these great forces are all-powerful and everywhere present; they dominate the age and have revolutionized the world. You are welcome, gentlemen, to the metropolis of the Northwest, and in behalf of the St. Paul Chamber of Commerce, and of the Jobbers' Union, I invite you to enter carriages with me at 5 o'clock and see the rapid improvement and development which is taking place in this municipality."

The association was also invited, in behalf of the Jobbers' Union, to leave Wednesday evening on a trip to Duluth, thence by Lake Superior to Apostle Islands and Ashland, returning to St. Paul Friday morning. Both of these invitations were accepted and afterward acted on, and the thanks of the association were voted to Mr. Phelps, the St. Paul Chamber of Commerce and the Jobbers' Union.

The chairman of the committee appointed to report on the advisability of adopting some character to take the place of the long dash to represent the cipher here said that his committee found, after consultation with the officials of various companies, that they had a pretty big job on their hands. Not only was it difficult to find a suitable character which would not conflict with any other, but it was entirely problematical whether the changes would be received with favor by the operators.

Mr. Selden made some remarks going to show that innovations were not so distasteful to the operators as many supposed. In fact, they introduced many themselves. Mr. Selden instanced the fact that the operators on his lines had, since the organization of the United Press, picked up and were now using many of the peculiarities of that system.

Mr. Sheldon thought that these matters of detail were always settled by the operators. They were either popular or they were not, and the only way was to go ahead, adopt some symbol and see what became of it in practice.

Mr. C. S. Jones said, referring to Mr. Sheldon's reference to details, that the details which bothered him the most were "rats," whereupon Mr. Sheldon remarked that if Mr. Jones would de-tail his rats just behind the ears they might not trouble him so much.

It was finally determined to refer the matter of the new symbol back to the committee for further consideration and another report next year.

The election of officers, which was next held, resulted in the choice of Asa R. Swift, of the Rock Island, as President. Mr. P. W. Drew, who has done excellent work for the association, was re-elected Secretary and his salary increased $50. Mr. Geo. L. Lang, of the New York & New England road, was re-elected Vice-President.

Under the head of miscellaneous business, the first question brought up was how to best do away with so much useless telegraphing on railroad lines. Mr. Selden gave his experience on this matter. In the first place, he said, success depended on the cordial co-operation of the general manager. He had had such co-operation, and the result was that he had done away with a large amount of this useless telegraphing. He simply had sent to him all useless telegrams. They were then referred to those from whom they had emanated, and in this way he had obtained good results. This subject was discussed at length by Messrs. Selden, Sheldon, Drew, C. S. Jones and others, with the result of finally referring it to a committee, to be reported on next year. This is considered a very important subject.

It was 3:30 P. M. when the afternoon session opened up. The report of the committee on time and place of next meeting was first listened to. The next meeting will be held in Boston, Mass., the second Wednesday of July, 1887. This will bring the telegraph superintendents and the old-time telegraphers in Boston the same week. I believe the last question taken up for the day was whether it would be advisable to require that all railroad operators be bonded. It was held in favor of this, that, while many of them handled no money to speak of, a good many handled trunks and goods, and that if all such were bonded it would be a relief to the superintendent and other officials. It seemed to be the sense of the meeting that this would not only be impracticable, but that it would result in the service losing many good and competent men, who, while perfectly trustworthy, were not in all cases able to answer all the technical requirements of the guarantee companies. It was evident, too, that the guarantee companies and their methods were not much thought of by some of the superintendents.

The association then adjourned until Friday morning.

On Friday morning a brief session was held, when the association adjourned, to meet in Boston next year.

The Edison induction telegraph was tested between Minneapolis and St. Paul during the convention. It will be remembered that I have already in my correspondence given an account of a personal inspection of the system at this point. The members all appeared to be greatly interested and pleased with what they saw.

Some of the members took a ride on the Van Depoele electric road in Minneapolis.

T. W. Snow was on hand with his electric signal for crossings: also Mr. Burns, of the Railway Telegraph Supply Co., Chicago, with a handsome line of goods.

W. A. K.

GREELEY, Col., June 14.

The electric light here proves to be a grand success and is giving universal satisfaction. The plant consists of two Brush incandescent dynamos, two Armington & Sims engines, Lowe feed-water heater, boilers set with Jarvis furnaces, etc. All the machinery is duplicated, and by means of a large switch-board all the circuits can be changed from one dynamo to the other in case anything happens to either. Everything about the plant is so arranged to do away with the remotest possibility of an accident.

The plant is situated in the centre of the city and the mains extend in all directions to a distance of over 2,500 feet from the station. The wires are so arranged that a uniform light is obtained even at the extreme ends of the circuits. The light is being universally adopted and is now used throughout the entire city. Churches, stores and all public buildings are brilliantly illuminated. The Oasis Hotel is lighted throughout by electricity, over 150 lights being in constant use.

The city is putting in large 150 c.-p. incandescent street lights, as they are preferred to arc lights for general use. Many of the private residences are enjoying the light, and it seems to be growing in public favor. The lights used are the Swan 16 c. p. and the large Westinghouse lamps.

It has generally been supposed that the incandescent light was too expensive a luxury for general use. The Greeley Company has endeavored to place the light within the reach of all, and notwithstanding the low price of the light, the company is on a good financial basis of success.

The Greeley plant demonstrates the fact that the incandescent light can be made a practical success, and that it will soon take the place of not only gas, but coal oil.

Mr. Sechrist, the manager and electrician of the company, is to be congratulated upon the success of this enterprise. The company was organized by him somewhat less than a year ago. The plant was started up the middle of February, and has been in successful operation ever since. It is now running at very nearly its full capacity, and the company is talking of enlarging this fall. This is undoubtedly the most successful plant in the Rocky Mountain region. Mr. Sechrist has now taken the contract for the installation of a plant at Wilcox, Pa., and is negotiating for the establishment of other plants. If there were more of these enterprising young electricians in the country who, instead of being satisfied with subordinate positions, would branch out for themselves, it would not be long before the electric light would be in universal use.

A. B.

GREENCASTLE, Ind., June 18, 1886.

The Greencastle Electric Light Company lighted up for the first time on Monday evening last. The electrical machinery was not connected until a few minutes to 8 P. M. Steam was immediately turned on, and everything worked smoothly. The plant consists of a 12 × 12 engine (New York Safety Steam Power Co.) and a 30-arc light dynamo, with lamps, made and put up by the Jenney Electric Co., of Indianapolis. The boiler room is fitted with a 16 × 60 boiler (46 flues), made by E. G. Brownell & Co., Dayton, O., a Turner heater and lime extractor, a double set of pumps, etc.

The lights are all taken and are giving entire satisfaction. The plant was furnished complete, including circuit by the Jenney Company, and is most satisfactory. The Greencastle *Banner* says: "The gentlemen composing the Electric Light Company deserve the greatest credit for their enterprise and faith in the city." The officers of the Company are: J. W. Cole, president; J. W. Weik, vice-president; George Hathaway, secretary and treasurer; J. C. Baker, superintendent; Ewing McLean, electrician, and T. M. Bosson, attorney.

E.

THE TELEGRAPH.

India.—The Indian Government Telegraph Department gives a return of about 3.3 per cent. interest on capital expenditure. During last year over 6,000 poles and seven miles of cable were added to the system. The new cable connection was made between India and Ceylon, and the Burmah-Siam line was completed. Great extensions are being made in Upper Burmah.

Tickers in Boston.—The Commercial Telegram Company now has 133 tickers in use in Boston, and the number is increasing because, it is said, of the greater speed of its system compared with the old system, and the noiselessness of the instruments now being set up. The executive officers of the company are H. J. Pettengill, general manager, and Louis Derrick, superintendent.

To the Behring Sea.—A report has just been made to the U. S. Senate, by Major Powell, on the opening up of Alaska and the building of a railroad through the territory for commerce with Asiatic Russia and Japan. The road is said to be feasible. In a general way the recommendation is that the proposed railroad shall follow the beds of streams instead of the plains, where it would be necessary to span many gullies. Advantage is taken of the valuable report made by the explorers who were sent by the Western Union Telegraph Company in 1865 to map out a route for that company to run its lines.

Illegality of Bucket Shops.—One of the many equity suits brought by the proprietors of the "bucket shops" to restrain the Philadelphia Local Telegraph Company from discontinuing the service of stock quotations was decided by Judge Allison there on June 19. The court held that the business conducted by the plaintiff is made up of gambling transactions, and is, therefore, illegal; that the company is not under any obligations to furnish stock quotations as a "common carrier," and that by the terms of the contract under which the plaintiff was supplied either party had the right to terminate it on one week's notice.

Adjunct to Fire Alarm Systems—In a memorial recently presented to the Providence City Council, it is suggested that the city adopt, as an adjunct piece of mechanism, the patented device of Councilman C. D. Rogers. A brief mention of the patent, No. 340,168, was given in our record on May 15. By means of the appliance, the fire department of any place can, in many instances, be brought to the scene before, by present methods, the box could be opened and an alarm sounded. One of the many points in this system of connecting private establishments with the public alarm boxes is the use of paper seals for guarding a novel key box or casing to which they may be applied. The system has been tried, and excellent results are reported. In one case, the fire alarm box was connected with thirty-seven different parts of the American Screw Company's works, yet each could sound the alarm instantly. We understand that the system is operated by the Alarm Box Controller Company, of Providence.

THE TELEPHONE.

The Southern Bell Telephone Company has declared a regular dividend of 1½ per cent., and an extra dividend of 1½, payable July 15. This makes $9 per share paid by the company in dividends this year.

The Wallace System in Indianapolis.—The Citizens Co-operation (Wallace) Telephone Company has been rather slow in putting up its poles and wires, under the city franchise granted to it, but is "getting ready as fast as possible under the circumstances."

Dividends.—The International Bell Telephone Company has declared a dividend of 3 per cent. on the capital stock, payable July 15, from the profits of the six months ended June 30. The directors of the Mexican Central Telegraph & Telephone Company have declared a dividend of 2 cents per share, payable on July 1, for which the transfer books will close June 21.

Snubbed.—A committee of the Board of Trade of Reading, Pa., who were appointed to inquire into the cause of the alleged inefficiency of the telephone service, visited Manager Matcham on June 15 and asked to be shown into the operating room. They were snubbed and informed that they could not go in, no matter what the result would be. Manager Matcham stated that the Eastern Pennsylvania Telephone Company was the only telephone company that had any power to operate in the section, and would maintain its rights.

The Pan-Electric Investigation—A dispatch from Washington says: Representative Ranney has asked Chairman Boyle of the House committee to investigate the Pan-Electric scandal, and not to present his report before next Thursday, as Ranney expects to be absent from Washington, in order to be present at the wedding of his son. Boyle's report will exonerate Attorney-General Garland and the other officials. Ranney's will simply present the main points of the evidence in a connected way. It will make out a clear case against the officials. All the Republicans will sign Ranney's report. It is not certain that all the Democrats will sign Boyle's report. Hale, of Missouri, may make a separate report, in which the officials will not be so lightly treated.

Signs of Returning Sense.—The Indianapolis *Journal* of June 17 says: "The Board of Aldermen last night concurred in the action of the Council whereby the city of Indianapolis will be permitted to have the benefit of telephone service, despite the effort to prevent it by an ignorant and corrupt Legislature. It has taken the two municipal bodies a long time to reach a conclusion on this matter, but the people are to be congratulated upon the fact that sober, second-thought common sense finally prevailed. Nearly all the newspapers of the city, except the *Journal*, did their best to cut off from our business men the use of the telephone, and relegate the city to the ways of village life; but we were unable to see how the indulgence of a stupid, blind rage against a monopoly that the law did not reach, but which resulted in a serious interference with business, was an evidence of anything else than imbecility."

Lafayette, Ind.—A dispatch of June 14, from Lafayette, reports as follows: Several months ago, during the telephone troubles in this city, the Common Council passed a mandate ordering the Central Union Telephone Company to remove all poles and wires from the streets before July 15. During the past few days an agent of the company has been in the city seeking to introduce a system making each subscriber an agent of the company, and thus evading the State law. This system is now on trial in several cities in the State, and a majority of subscribers here agreed to try it. The Merchants' and Manufacturers' Exchange, however, were decidedly opposed to evasion of the law, and presented a petition to the Council to-night asking them to enforce the mandate compelling vacation of the city. The Council granted the petition, and the telephone company must conform to the legal rate or leave. The attorney for the company will advise them to vacate the city entirely after July 1.

THE ELECTRIC LIGHT.

Lawrence, Mass.—The Edison Company, of Lawrence, has installed an incandescent plant of 250 lamps in the Arlington mills.

Camden, N. J.—The City Electric Light Company has been incorporated with a capital stock of $100,000. The directors are H. Robinson, F. Kane and M. Cohlman.

Litigation in England.—We hear on good authority that Woodhouse & Rawson intend to make incandescent lamps as actively as they did before the recent suits, modifying, however, their processes of manufacture.

Volta Pavia in London.—Advices from London state that Volta-Pavia solution is awakening considerable interest there. Its use in domestic and other small incandescent lighting is very favorably regarded and commented on.

Hands Off!—A public meeting, largely attended, was recently held at Comerfordville, San Francisco, to protest against a proposed removal of some of the electric lights on the streets to other places. Three hundred names were signed to a memorial. Probably more lights will be put in.

Brown Automatic Converter.—The Brown Electric Company is about removing its factory from Chicago to Pittsburgh, where the stock is owned by a number of prominent capitalists. The Brown automatic converter, lately improved and perfected by the company, is likely to occupy an important place in electric lighting.

Cottage City, Mass.—The Ball Electric Light Company has just installed a 70-light plant at Cottage City, in combination with a water-gas plant of recent invention, so arranged that the heat of the gas-works passes directly through the boiler to generate steam for the electric plant, thus reducing the cost of the arc lights to a minimum. Thus electricity and gas join hands in a very novel way.

Salem, Mass.—At a meeting on June 14 of both branches of the Salem City Council, the matter of an electric fire alarm was taken up, and the committee asked for $6,000, instead of $5,000, as originally desired. The matter was laid over to the next meeting for details. The substitute order appropriating $6,000 for an electric fire alarm was passed to a second reading. The order appropriating $2,000 for one hundred electric lights was passed.

The Light in Laramie, Wyoming.—An Edison plant has been installed by the Laramie Electric Light Company. The original incorporators were Messrs. J. W. Donnellan, M. N. Grant, R. H. Homer, H. G. Balch, S. W. Downey, R. M. Jones, W. H. Holliday and R. Marsh, who organized with Mr. Grant as President, Mr. Holliday as Vice-President, Mr. Jones as Secretary and General Manager, and Mr. Donnellan as Treasurer, these gentlemen, with Messrs. Balch and Homer, constituting the board of directors. The plant went into operation June 10, amid the joy of the townsfolk, and its starting up was signalized by fireworks, band-playing and a balloon ascension. The electricians, Messrs. Bates and Hancock, were serenaded. The system is equipped for both public and domestic lighting, and "Laramie can now, without fear, invite comparison with any city west of the Missouri River."

The Short Dynamo.—Denver papers give a description of the new dynamo exhibited there this month by Professor Short, running lamps of 150, 16 and 10 c. p. up to a capacity of one hundred 16 c. p. lamps: "Professor Short says that this is the smallest dynamo in the world for that capacity, and is less than half the weight of the best machine for the same number of lights. Its full capacity of 100 sixteen candle-power lights only requires seven and one-half horse power. In detail, the machine is but 14 × 12 inches, and fifteen inches high. There are four field pieces, each 5 × 7 inches in size, and holding ten pounds of copper wire. The armature is twelve inches in diameter, carrying eight pounds No. 12 copper wire. The armature is triangular shaped, with wings fastened on the axle, which send a current of air continually through the armature and out at its edge, thus preventing any heat from possible friction. The field-pieces are upright to allow getting at the magnetic field when wanted. The normal speed is 2,000 revolutions per minute. This little dynamo weighs but 400 pounds, yet is doing the same work that the 2,000 pound dynamos of Professor Short's former construction are doing."

APPLICATIONS OF POWER.

Windsor, Can.—A permanent electric railway on the Van Depoele overhead conductor system has been built at Windsor, Can., by Mr. J. W. Tringham, a well-known electrician of that city. It went into operation on June 9, under the personal supervision of Messrs. Van Depoele and Tringham, and in presence of a number of leading citizens of Windsor and Detroit. The line is a mile and a half long, and the cars make trips every 15 minutes. A speed of 12 miles an hour is attained very easily with full load of passengers. Mr. Tringham hopes to extend the road very soon. The prosperous and enterprising town is to be congratulated upon this recent increase in its attractions and conveniences, which already included telephones and electric lights.

Ryde, England.—An electric tramway has been opened on the well-known pier of the above watering-place. The line has hitherto been worked by horse traction; but some time since the directors determined to substitute an electric railway, and intrusted the work to Messrs. Siemens & Co. The prime motor is a gas engine, which is connected by a belt to one of Siemens' shunt-wound dynamos, performing about 1,000 revolutions per minute. The current is carried by cable to the positive conductor, which is a rod of channel iron running by the side of the tramway and supported by brackets fitted on the sleepers and insulated. The ordinary rails, which are of steel, are used as the return circuit. The current is taken to a motor under one of the cars by means of a sliding contact. Each train is worked by one of the ordinary passenger carriages fitted with a motor, and each is capable of carrying about thirteen tons. The carriages are driven up and down the railway at the rate of about twelve miles an hour, the motion being easy.

The Daft Electric Power System.—The Daft Electric Light Company, of 115 Broadway and Jersey City, N. J., has lately published an interesting illustrated pamphlet on electric railroads and the electric transmission of power by the Daft system. Very full details are given in regard to the Daft electric street railway at Baltimore. From a map of the line one obtains a good idea of the many curves and grades, and from figures supplied by Mr. T. C. Robbins, General Manager of the Baltimore Union Passenger Railroad Company, we learn that the line has carried 31,907 more passengers than it did with horses during a like period of nine months, and that the cost per passenger has been only 1.66 cents, as compared with 3.01, or .83 cents per passenger mile as compared with 1.55 cents with horses. The cost of horse-power per day was $18; the cost of electric power is $12. The details furnished in connection with stationary electric power installations are valuable and encouraging. The pamphlet, which should be in the hands of all interested in electric motors, closes with a chronological record of the leading Daft installations made since 1882.

PERSONALS.

Mr. Cyrus W. Field has brought action for libel, in England, against Mr. Henry Labouchere, who has been putting things rather strongly in his society journal *Truth*. The trial began this week.

Mr. Roswell P. Flower is working at the New York underground wire problem in the right spirit. He is desirous that all who have plans shall have a chance to present them to the Subway Commission. "I want to cover the whole ground," he says. "I don't want anybody to be crowded out. I don't want the city to lose anything because by overhaste to end our investigation we barred out some plan of value."

MISCELLANEOUS NOTES.

New York Subway Commission.—Before the Commission on June 22, Mr. J. F. Bailey and Mr. C. L. Clarke presented the merits of the Siemens system of underground wiring. Models of the system are to be shown. Mr. Ronald McDonald advocated the use of a simple two-inch plank conduit, the wood to be covered with copper. The Third avenue street-car people, who propose constructing a cable system for their line, are desirous of having the Commission use the trench as a subway for the wires on the east side of the city. The proposition is not entertained very enthusiastically.

A New Method of Shanghaing.—A gentleman of Shanghai has, after considerable experimenting, invented a new and deadly weapon. This is an electric sword, which, when the point touches the party attacked, sends a powerful shock through him, and if not immediately killing, will at least put him *hors de combat*. The sword is an ordinary military sabre, but along its whole length is let in a fine platinum wire, which ends at the foil of the weapon. A small but very powerful storage battery is carried strapped about the waist, much the same as a cartridge box. Insulated wires connect this battery with the sword, and by pressing a button the holder can complete the circuit at pleasure.—*Shanghai (China) Courier.*

SPARKS AND FLASHES.

Political Science.—There are thunderstorms about now, and there is much talk of the "electric fluid." We must correct our obsolete phraseology. There is no "electric fluid;" it doesn't dart from the clouds; it doesn't strike anything. It is not a fluid or any form of matter; it is one of the correlated forces, and simply a mode of motion—but lively; it must be admitted to be lively.—*Washington Post.*

STOCK QUOTATIONS.

Telegraph, telephone and electric light quotations on the New York Stock Exchange, Boston Exchange and elsewhere are as follows:

Telegraph.—B. & M., b 2¼, a 3; Western Union, b 63⅞, a 64.

Telephone.—Am. Bell, b 181, a 182; Erie, b 27¼, a 28; Mexican, b 1; New England, b 34½, a 35.

Electric Light.—No new quotations.

BUSINESS NOTICES.

Office of PROVIDENCE ELECTRIC SUPPLY CO.,
Mfrs. and Wholesale Dealers of
ELECTRICAL GOODS OF EVERY DESCRIPTION,
56 *Washington Street*,
PROVIDENCE, R. I.. Jan. 15, 1886.

The Smith & Shaw Elect. Co.—*Gents:* We have sold your Batteries from the start, and they have given better satisfaction to our customers (many of them physicians) than any other Pocket Battery we have seen.

Yours truly, C. H. DOUGLAS, M. D., Manager.

The Electric Gas Lighting Company, of Boston, Mr. Louis W. Burnham, Vice-President and General Manager, calls special attention in this issue, page v., to its numerous well-known appliances and gas lighting apparatus. With its increased facilities for production, the company is ready to fill promptly all orders. Descriptive circulars, price lists, etc., can be had on application.

A Good Thing Appreciated.

WHITING, Hill Co., Texas, March 10, 1885.

Jerome Kidder Mfg. Co., 820 Broadway, New York.

DEAR SIRS: The cords, plates, etc., came to hand in due season. Inclosed please find P. O. order for the amount. I am delighted with my battery. It is performing splendid service. I am perfecting cures with it that have for years resisted the best medical treatment.

Yours truly, B. G. WILLIAMS, M. D.

German Corn Remover

Kills corns and bunions, unfailing, rapid, painless; 25c.
HILL'S HAIR AND WHISKER DYE, black and brown; 50c.
PIKE'S TOOTHACHE DROPS will cure in one minute; 25c.
DEAN'S RHEUMATIC PILLS are a prompt, sure cure; 50c.
HALE'S HONEY, the great cough cure; 25c., 50c. and $1.
GLENN'S SULPHUR SOAP heals and beautifies the skin; 25c.

OUR ILLUSTRATED RECORD OF ELECTRICAL PATENTS

PATENTS DATED JUNE 8, 1886.

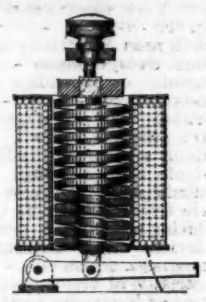
343,176. Motor; Enos T. and Daniel Higham, Philadelphia, Pa. Consists of the armature-shaft in two parts insulated from each other, and field-magnet frame having the bearings for the shaft insulated from each other, with magnetic reversing-bars and contact-points therefor carried by the two parts of said shaft.

343,188. Arc Lamp; Otto A. Moses, New York, N. Y. Consists of a regulating magnet or solenoid, its movable core or armature, the movable carbon-carrier, and a clamp suspended from said core or armature, composed of two discs, rings, or washers pivoted one upon or within the other and encircling said carbon-carrier.

343,227. Electro-Magnet; Elisha B. Cutten, Pittsburgh, Pa., Assignor to the Electrical and Mechanical Developing Company of same place. The core, as shown in the cut, is a helix secured at one end.

343,242. Arc Lamp; Oscar F. Jönsson, Stockholm, Sweden. Consists in mechanical details where the top carbons with their holders are exactly counterbalanced by weights and chains, in order to reduce to a minimum the power required for regulating the arc and maintain the length of the arc constant, whereby irregularities in the light are prevented as far as possible.

343,266. Switch; Alexander Bernstein, London, England. Consists of a permanent resistance arranged to act as a temporary pass for the main current, of an electro-magnet, the armature of which operates so as to arrest the movement of the switch-lever in case of interruption of the circuit, which it is intended should be included in the main circuit.



343,227. ELECTRO-MAGNET.

343,313. Incandescent Lamp-Holder; Louis Heinze, Lynn, Mass. The contacts between the leading-in-wires are disposed as shown in the cut.

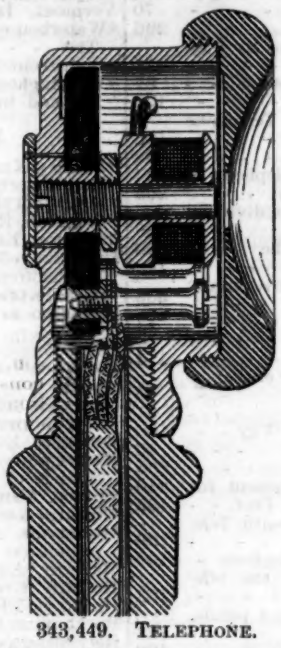
343,319. Transportation of Goods by Electricity; F. Jenkin, deceased; J. I. Peyton, Administrator. The invention has at least fourteen distinct features. One of them consists in combining an insulator carrying an insulated rope or rod upon which vehicles can run with an insulating-block capable of rocking about a pin or axis connecting it with a support, such block having horn-pieces clamped around it, and conducting ropes or rods carried on the horn-pieces.

343,332. Ball Ornament for Lightning Rods; Alvin J. Munson, Indianapolis, Ind. Embraces a ball consisting of two joined hemispheres near the point.

343,334. Telephone; James F. McLaughlin, Philadelphia, Pa. Comprises a case, a diaphragm, and a helix common to two separate soft iron bars, each of which is attached to a pole of separate permanent magnets arranged with their poles opposing but separate from one another, the other poles of which are provided with helices, and all said helices being in circuit with one another or in common line-circuit.

343,354. Underground Conduit; Arcalous Wyckoff, Elmira, N. Y. Consists of a series of strips, each so formed that it may be arranged at an angle to adjacent strips in building up the body of the article, so as to form close joints when all the strips are bound together.

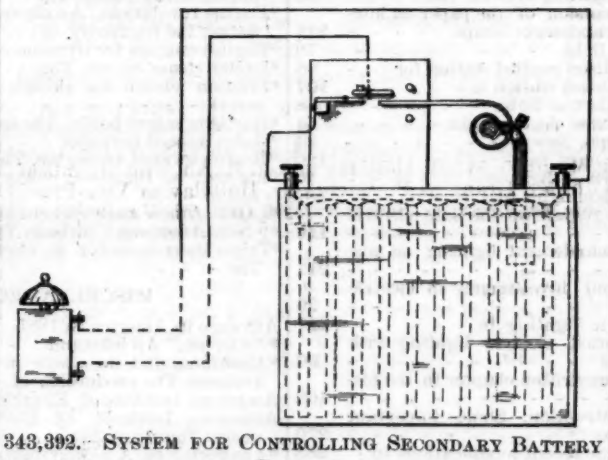
343,372. Circuit Closer; Harvey H. Hoffman. Con-



343,449. TELEPHONE.

sists of a wire or series of connected wires crossing a second wire or series of connected wires and separated at their points of crossing by an intervening elastic non-conducting material so applied as to hold the wires in juxtaposition and allow them to come into contact when pressure is applied, but at other times to hold them apart.

343,373. Reverse Current Interceptor; 343,374. Communicating System; Alfred G. Holcombe, New York, N. Y., Assignor to the Equitable Electric Co., same place. 1. Consists of an automatic cut-out having independent exciting-coils on the core or cores of an electro-magnet, one of which is included in a shunt from the main circuit of the dynamo-electric machine



343,392. SYSTEM FOR CONTROLLING SECONDARY BATTERY CIRCUITS.

and the other coil in the main or charging circuit. 2. Consists in improvements upon his patent 336,809 of Feb. 23, 1886.

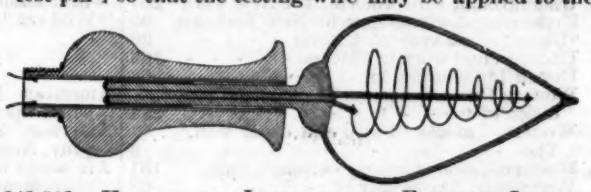
343,392, 343,393, 343,394. (1) System for Controlling Secondary Battery Circuits; (2 and 3) System for Regulating and Controlling Electric Motors; John M. Pendleton, New York, N. Y., Assignor to the Equitable Electric Company, of same place. (1) The expelled hydrogen from the secondary battery is absorbed by and heats spongy platinum, which acts upon a thermostat regulator, shown in the cut. (2) It is an enlargement of invention described in his patent 323,199, of July 25, 1885. (3) The method of regulating electro-motors consists in operating such motors by the differential of two opposing sources of current and varying the electromotive force of one of said sources.

343,444. Motor; John Doyle, Hoboken, N. J., Assignor to himself and C. Coles Dusenbury, New York, N. Y. The compound field-magnet is made of numerous permanent magnets secured together and to soft-iron pole-pieces that are magnetized by induction from the permanent magnets.

343,449. Telephone; Ezra T. Gilliland, Boston, Mass., Assignor to the American Bell Telephone Co., of same place. Consists, as shown in the cut, in the employmen of an iron core, in mechanical and magnetical connection with the upper or coil-inclosing portion of the telephone case, both core and inclosing-cup being made of magnetizable metal, the latter being preferably cast-iron.

343,450. Meter; J. Ross Grove, York, Pa. The leading claim is: The combination, with the devices to be operated by the current whose time of use is to be measured, of a registering apparatus, clock-work mechanism, and electrical devices operated by an independent current.

343,458. Underground Conduit; George S. Hull, Elmira, N. Y. It is carried out by extending each conductor in an unbroken line through the test-box, and there connecting it electrically with one or more fixed test-pins, so that the testing-wire may be applied to the



343,313. HOLDER FOR INCANDESCENT ELECTRIC LAMPS.

test-pins to test the condition of each conductor in the ordinary manner.

343,468, 343,469. Telegraphy; James A. Maloney, Washington, D. C. 1. The telegraph sounder consists of a flexible armature-lever, an auxiliary arm attached to said lever, and a cup thereon for detaining one end of a detachable helical spring, in combination with said spring and an adjusting-screw bearing against the opposite end of the spring. 2. Consists of improvements upon his patents, 336,653, of Feb. 23, 1886, and 339,969, of April, 13, 1886.

343,515. Electrical Coupler; George D. Burton, New Ipswich, N. H. The couplings consist of the non-conducting annuli, one within either coupling and held in place by the coupling-cap, and provided each with a yielding contact-button, and electrical conductors contained within the couplings and electrically connected with the buttons.

343,887. Motor; Henry M. Paine, Newark, N. J. Consists of a magnet having a longitudinal groove in its pole-face with an armature arranged in co-operative relation to said magnet.

Copies of the specifications and drawings complete of any of the patents mentioned in this record—or of any other patent issued since 1866—can be had from this office for 25 cents. Give the date and number of patent desired, and address Johnston's Patent Agency, 9 Murray st., New York.

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